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United States Department of Agriculture

Research, Education, and Economics

Agricultural Research Service

Washington, D. C.

Agricultural Research Service FY 2002

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Explanatory Notes

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FY 2002 Explanatory Notes
Agricultural Research Service

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AGRICULTURAL RESEARCH SERVICE
Purpose Statement

The Agricultural Research Service (ARS) was established on November 2, 1953, pursuant to authority vested in the Secretary of Agriculture by 5 U.S.C. 301 and Reorganization Plan No. 2 of 1953, and other authorities.

The research performed by ARS is authorized by the Department of Agriculture Organic Act of 1862 (7 U.S.C. 2201, 2204), the Research and Marketing Act of 1946, amended (7 U.S.C. 427, 1621), the Food and Agriculture Act of 1977, as amended (7 U.S.C. 1281 note), the Food Security Act of 1985 (7 U.S.C. 3101 note), and the Food, Agriculture, Conservation, and Trade Act of 1990 (7 U.S.C. 1421 note), Federal Agriculture Improvement and Reform Act of 1996 (Fair Act) and the Agricultural Research, Extension, and Education Reform Act of 1998 (P.L. 105-185).

The mission of ARS research is to develop new knowledge and technology which will ensure an abundance of high quality agricultural commodities and products at reasonable prices to meet the increasing needs of an expanding global economy and provide for continued improvement in the standard of living of all Americans. This mission focuses on the development of technical information and products which bear directly on the need to: (1) manage the Nation's soil, water, air and climatic resources, and improve the Nation's environment; (2) provide an adequate supply of agricultural products by practices that will maintain a permanent and effective agriculture; (3) improve the nutrition and well-being of the American people; (4) improve the quality of life in rural America; and (5) strengthen the Nation's balance of payments. The research applies to a wide range of goals; commodities; natural resources; fields of science; and geographic, climatic and environmental conditions.

As the Department of Agriculture's largest in-house research agency, ARS has major responsibilities for conducting and leading the national agricultural research effort. It provides:

* Research on broad regional and national problems.
* Research to support Federal action and regulatory agencies.
* Expertise to meet national emergencies.
* Scientific resources to the Executive Branch and Congress.

ARS is responsible for the following major program activities:

- Research to develop new knowledge to better manage and enhance the Nation's soil, water, and atmospheric resources to optimize agricultural productivity and environmental quality.
  Conserving and enhancing the Nation's soil, water, and air resources requires the development of guidelines for evaluating the impact of current practices and assessing the potential effects of changing practices on the quality and productive capacity of these resources. Research stresses the discovery and integration of knowledge into agricultural land management systems that can be used to maintain and enhance farm profitability, while reducing or reversing adverse impacts on long-term productivity and the environment. Management practices are being developed that will make better use of available water resources, enhance soil quality and reduce erosion, improve nutrient use efficiency, and provide an optimum environment for crop growth. The impacts of air quality on agricultural production and the effect of agricultural practices on air quality and sustainability of agricultural systems are evaluated. In addition, the effects of global change on the natural resources and the appropriate response measures are researched.

- Research to expand the knowledge and technology base necessary to maintain and increase the productivity and quality of crop plants.
  Emphasis is placed on improving the efficiency of crop production and the quality of market products to meet processor and consumer needs, and maintaining and improving the competitiveness of U.S. agricultural products in domestic and world markets. Research is conducted on a broad range of crops including grains, oilseeds, sugar crops, fruits, vegetables, ornamentals, forage, range, and industrial crops.

The National Plant Germplasm System provides the foundation for genetic improvement and encompasses the acquisition, preservation, evaluation, and enhancement activities necessary to properly utilize plant germplasm. Biologically-based technologies are being used in integrated pest management systems to protect plants from diseases, insects, and weeds, thereby reducing dependence on agricultural chemicals. Special emphasis is placed on sustainable agricultural production systems that are effective, profitable, and protective of soil, air, and water resources.

- Research to provide new knowledge and technology to maintain and increase productivity and quality of animals and animal products.

Primary emphasis is placed on improving the efficiency of livestock, poultry, and aquaculture production while simultaneously improving the quality of the end product. The total effort is designed to solve both short- and long-term, high priority national problems and to address the needs of action and regulatory agencies. Major thrusts include improving the productivity of animals; assuring the quality and safety of animal products used as food for humans; and reducing losses due to pathogens, diseases, parasites, and insect pests. To accomplish these goals, new technological innovations are needed to preserve and effectively utilize animal germplasm; understand how specific genes improve production, reproduction, and animal product quality; enhance genetic resistance to diseases; improve techniques to rapidly diagnose, prevent, manage, or eliminate diseases, parasites, and insect pests; and detect and control microbial and chemical residue contamination in live animals and animal products. Research is currently underway to more rapidly change the genetic makeup of animals and improve their reproductive efficiency and growth potential; improve the nutritional components of animal feedstuffs; genetically reduce lipids in animal products; develop genetically engineered vaccines for protection against pathogens, diseases, parasites, and insect pests; and develop new, rapid, and accurate methods of disease diagnosis. Also, research is being conducted to improve the safety of animal food products; develop integrated management technologies for insect pests and disease vectors; improve the well-being and humane care of farm animals in production facilities; and develop the means to manage and utilize animal wastes to reduce contamination of surface and groundwater.

- Research to develop and expand technologies necessary to achieve maximum use of agricultural commodities in domestic and world markets.

Increasing the economic viability of rural communities and competitiveness of U.S. agriculture by enhancing the quality, assuring the safety, and increasing the use of agricultural materials in products for domestic and global markets is essential to developing postharvest research strategies.

Food Safety--Reduction of potential risks for consumers caused by pathogens in food is a core focus of ARS' food safety program. Much of this research is devoted to all aspects of preharvest and postharvest pathogen reduction. Lowering risks from naturally occurring toxicants, mycotoxins, and chemical residues in the food supply is the other major thrust of food safety research. These activities lead to reduced health risks for consumers, and enhanced economic opportunities for farmers and processors.

Commodity Quality-- Maintaining the quality of U.S. commodities is a key factor to increasing domestic and foreign market demand. Technologies to assess and maintain the important physical, sanitary, and performance characteristics of agricultural commodities are essential to enhanced economic opportunities and global competitiveness.

Trade and Quarantine Barriers--Processes to eliminate or control postharvest insects and spoilage organisms are crucial to enhance economic opportunities for U.S. commodities by overcoming regulatory and quarantine trade barriers. Emphasis is on the development of acceptable treatment technologies for agricultural commodities that meet regulatory and quarantine requirements. This enhances global competitiveness and economic opportunities for the U.S. agricultural system, while protecting the environment by devising alternatives to the use of ozone depleting fumigants such as methyl bromide.

New Uses and Process Improvement--The program has three segments: (1) development of new products and processes based on vegetable oils, animal fats, oilseed and grain proteins, carbohydrates (starch), and established fibers (cotton and leather); (2) finding uses for new crops not now grown on a significant scale in the U.S. (guayule, jojoba, lesquerella, kenaf, flax); and (3) producing biofuels, principally ethanol made from high starch crops and biodiesel made from vegetable oil (soybean) and animal fats. The focus of this research is lower cost processing technologies and creation of new products from agricultural crops to meet domestic and global demands, thus expanding U.S. economic opportunities and enhancing global competitiveness.

- Research to develop new technology essential to improve human health and well-being through improved nutrition.
  USDA has the primary responsibility for developing fundamental information on human nutrition requirements which provides the basis for development of dietary guidelines and food assistance programs. As the Federal government's lead agency for human nutrition research, ARS activities are directed toward understanding the effects of diet by using healthy human volunteers of all ages. The objectives of the research are to improve human health by defining nutrient requirements to enable robust physical and mental functions and increase resistance to disease and slow the aging degeneration. The research includes determination of food consumption patterns, development of nutritional status assessment technologies, assessment of nutrient composition of foods, and maintenance of the national Nutrient Database, a compendium in printed and electronic form of the information. Research on strategies to effect public acceptance of change in dietary habits focuses on regional influences in the Lower Mississippi Delta. The knowledge derived from these activities provides multiple benefits to the Nation, in the form of a healthy population, reduced health care costs, longer active life spans, cost-effective food assistance, and improved life.

- Integrate knowledge of agricultural production, processing, and marketing into management systems which optimize utilization of users' resources and net returns.
  Finding solutions to important national problems faced by agriculture requires the integration of components of research from all areas of the agricultural and natural resource system. These components include soils, water, climate, plants, animals, insects, diseases, weeds, and people. This research evaluates the interaction of many components that constitute a system including an agroecosystem, a watershed, or a farm. Systems research integrates results into products that aid or improve the timeliness and pertinence of decisions made by managers of agricultural systems. Discovery and understanding of critical gaps in knowledge that can be integrated from ongoing component research into further refinements of systems is a critical aspect of these efforts. Systems research leads to reduced input costs, higher returns, improved product quality, more efficient resource use, reduced environmental impact, and improved sustainability of agricultural production systems that meet long-term societal needs. The research requires multi-disciplinary efforts which is often located at various sites throughout the United States. Team members are linked through national information networks to share concepts and databases required to build and evaluate models. Mathematical models are one of several techniques used to describe real systems. Experiments are performed to understand responses over time to alternative environments or management practices. Decision support systems can be devised that integrate available knowledge, simulation models, records of personal experience and observations, and error analysis that permit a manager to compare and evaluate management options.

- Identify, acquire, organize, preserve, and disseminate pertinent food and agricultural information.
  Overall, the thrust of the National Agricultural Library (NAL) activities is to utilize computer and electronic technologies to provide access to scientific and agricultural information, irrespective of where it resides, to USDA, public organizations, and individuals. To this end, NAL is addressing within its strategic plan how it will provide global leadership in identifying and implementing new methods, techniques, and technologies for improving access to and management of agricultural information.

NAL activities continue to rely heavily on incorporation of electronic technologies. Many of the new information technologies have been embraced and, as a result, many individuals within the agricultural community look to NAL to lead agricultural libraries into the electronic age. Support of the Electronic Information Initiative and Digital Preservation of older materials, has aided in moving into the electronic information age.

- Repair and maintenance of facilities. Funds are used to repair and maintain ARS facilities to provide safe, energy efficient and functional workspace for in-house research. The Agency is committed to adequately funding routine maintenance and repair to assure that all facilities are properly maintained. Each location also allocates program funds, as appropriate, to perform the most urgent repairs or maintenance of facilities.

The Department has a central fund to promote facility compliance under requirements of the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation Recovery Act. These Acts require Federal agencies to meet the same standards for storage and disposition of hazardous wastes as do private businesses. The funds provided for this program enable the Department to address problems caused by past uncontrolled hazardous waste disposal practices and to deal with the regulation of current hazardous substances. Resources are allotted to USDA agencies from the central fund. The Agency supplements these funds as necessary.

ARS' Headquarters offices are located in the Washington, D.C. metropolitan area. Field activities are managed on a national basis through eight Area Offices. Research is conducted at field locations in the United States, District of Columbia, Puerto Rico, the Virgin Islands, and several foreign countries. Much of the work is conducted in direct cooperation with State agricultural experiment stations, other State and Federal agencies, and private organizations. ARS programs are organized and managed at the national level under 22 national program areas.

As of September 30, 2000, there were 6,570 full-time employees and 1,890 other than full-time employees. Of the total, 504 full-time employees and 26 other than full-time employees worked in offices located in the Washington, D.C. metropolitan area.

During FY 2000 the following GAO and OIG reports were completed:

GAO Report: "Biotechnology: Information on Prices of Genetically Modified Seeds in the United States and Argentina," RCED/NSIAD-00-55, published January 21, 2000.

GAO Report: "Agricultural Research: USDA's Response to Recommendations to Strengthen the Agricultural Research Service's Programs and Facilities," RCED-00-85R, published February 15, 2000.

GAO Report: "Food Safety: FDA's Use of Faster Tests to Assess the Safety of Imported Foods," RCED-00-65, published February 25, 2000.

GAO Report: "Food Safety: Improvements Needed in Safety of Dietary Supplements and Functional Foods," RCED-00-156, published July 11, 2000.

GAO Report: "Invasive Species: Federal and Selected State Funding to Address Harmful Nonnative Species," RCED-00-219, published August 24, 2000.

OIG Report: "Incurred Cost Audit," Global Associates, Oakland, CA, 02-017-000-SF, released May 5, 2000.

OIG Report: "Bionetics Corp. FY 1994 & 1995 Incurred Cost Audits," 02-017-0015-HY, released December 3, 1999.

OIG Report: "Bionetics Corp. - 1996 Incurred Cost Audit," 02-017-0016-HY, released March 3, 2000.

The following GAO and OIG reports are in progress:

GAO Review: "Review of Agricultural Biotechnology Trade."

GAO Review: "Invasive Species Early Warning and Rapid Response."

OIG Review: "IT Security at the Agricultural Research Service," Assignment No. 02-099-0001-FM.

OIG Review: "Management of USDA Hazardous Waste Management Funds," Assignment No. 50-801-12-AT.

AGRICULTURAL RESEARCH SERVICE

Available Funds and Staff Years
2000 Actual and Estimated 2001 and 2002

Item	2000 Actual		2001 Estimated		2002 Estimated	
	Amount	Staff Years	Amount	Staff Years	Amount	Staff Years
Salaries and Expenses	$834,322,000	7,356	$898,812,000	7,732	$915,591,000	7,732
Rescission	-3,938,000	--	-1,977,000	--	--	--
Transfer from U.S. Agency for International Development	5,000,000	--	--	--	--	--
Transfer from OSEC for Congressional Relations	129,000	--	--	--	--	--
Subtotal, Agricultural Research Service	835,513,000	7,356	896,835,000	7,732	915,591,000	7,732
Agricultural Risk Protectecion Act	--	--	17,500,000	--	--	--
Total, Salaries and Expenses	835,513,000	7,356	914,335,000	7,732	915,591,000	7,732
Buildings and Facilities	52,500,000	--	74,200,000	--	30,462,000	--
Rescission	--	--	-163,000	--	--	--
Total, Building and Facilities	52,500,000	--	74,037,000	--	30,462,000	--
Total, Agricultural Research Service	888,013,000	7,356	988,372,000	7,732	946,053,000	7,732
Allocations from:						
Hazardous Waste Management	3,968,520	--	3,250,000	--	3,000,000	--
Obligations under other USDA appropriations:						
Agricultural Marketing Service	346,568	4	381,000	4	381,000	4
Animal and Plant Health Inspection Service	7,163,531	51	7,880,000	51	7,880,000	51
Cooperative State Research, Education and Extension Service	5,314,746	38	5,846,000	38	5,846,000	38
Economic Research Service	2,896,033	21	3,186,000	21	3,186,000	21
Farm Service Agency	832,252	6	915,000	6	915,000	6
Food and Nutrition Service	150,000	2	165,000	2	165,000	2
Food Safety and Inspection Service	2,212,577	17	2,434,000	17	2,434,000	17
Foreign Agricultural Service	998,941	7	1,099,000	7	1,099,000	7
Forest Service	508,230	4	559,000	4	559,000	4

Available Funds and Staff Years
2000 Actual and Estimated 2001 and 2002

Item	2000 Actual		2001 Estimated		2002 Estimated	
	Amount	Staff Years	Amount	Staff Years	Amount	Staff Years
Other USDA Funds (continued)						
Grain Inspection, Packers and Stockyards Administration	39,557	--	58,000	--	58,000	--
National Agricultural Statistics Service	2,885,454	21	3,174,000	21	3,174,000	21
Natural Resources Conservation Service	676,257	5	744,000	5	744,000	5
Office of the Chief Economist	115,000	--	127,000	--	127,000	--
Office of the Inspector General	44,213	--	49,000	--	49,000	--
Quarters and Subsistence	111,604	--	123,000	--	123,000	--
Rural Development Mission Area	12,500	--	14,000	--	14,000	--
Sale of Animals and Personal Property (Proceeds)	745,857	--	820,000	--	820,000	--
Misc, Reimbursements	408,065	--	9,737,000	--	9,737,000	--
Total, Other USDA Appropriations	25,461,385	176	37,311,000	176	37,311,000	176
Total, Agriculture Appropriations	917,442,905	7,532	1,028,933,000	7,908	986,364,000	7,908
Other Federal Funds:						
Agency for International Development	42,126	--	46,000	--	46,000	--
Department of Commerce	31,230	--	34,000	--	34,000	--
Department of Defense	2,800,195	24	3,080,000	24	3,080,000	24
Department of Energy	1,421,848	10	1,564,000	10	1,564,000	10
Department of Health and Human Services	3,332,995	28	3,666,000	28	3,666,000	28
Department of the Interior	817,689	6	899,000	6	899,000	6
Department of Justice	30,000	--	33,000	--	33,000	--
Department of Treasury	48,206	--	53,000	--	53,000	--
Environmental Protection Agency	1,138,957	8	1,253,000	8	1,253,000	8
General Services Administration	53,197	--	59,000	--	59,000	--
National Aeronautics and Space Administration	1,182,426	9	1,301,000	9	1,301,000	9
National Science Foundation	25,575	--	28,000	--	28,000	--
U.S. Nuclear Regulatory Commission	51,700	--	57,000	--	57,000	--
Misc, Other Federal Funds	11,230	--	4,028,000	--	4,028,000	--

Available Funds and Staff Years
2000 Actual and Estimated 2001 and 2002

Item	2000 Actual		2001 Estimated		2002 Estimated	
	Amount	Staff Years	Amount	Staff Years	Amount	Staff Years
Non-Federal Funds:						
Arizona, University of.	56,977	--	63,000	--	63,000	--
Arkansas, University of.	37,180	--	41,000	--	41,000	--
Auburn University	25,480	--	28,000	--	28,000	--
Binational Agricultural Research and Development Agreement (BARD)	433,429	4	435,000	4	435,000	4
Biotechnology Research and Development Corporation (BRDC).	13,500	--	15,000	--	15,000	--
California, State of.	371,891	3	409,000	3	409,000	3
California, University of.	99,750	1	110,000	1	110,000	1
Clark County Stockgrowers Assoc . .	25,174	--	28,000	--	28,000	--
Clemson University.	31,659	--	35,000	--	35,000	--
Colorado State University.	28,070	--	31,000	--	31,000	--
Cornell University.	18,564	--	20,000	--	20,000	--
Cotton Foundation.	68,098	--	75,000	--	75,000	--
Cotton Incorporated.	527,287	4	581,000	4	581,000	4
Florida, State of.	517,851	4	570,000	4	570,000	4
Delaware, University of.	61,665	--	68,000	--	68,000	--
Georgia, University of.	36,291	--	40,000	--	40,000	--
Iowa State University.	75,156	--	83,000	--	83,000	--
Louisiana State University.	14,361	--	16,000	--	16,000	--
Maryland, State of.	13,814	--	15,000	--	15,000	--
Megan Health Inc.	15,213	--	17,000	--	17,000	--
Minnesota, University of.	76,658	--	84,000	--	84,000	--
National Pork Producers Council. . . .	106,145	1	117,000	1	117,000	1
National Space Development Agency of Japan.	70,800	1	78,000	1	78,000	1
Nature Conservancy, The.	16,529	--	18,000	--	18,000	--
Nebraska, University of.	31,883	--	35,000	--	35,000	--
New Mexico State University.	30,416	--	33,000	--	33,000	--
North Carolina, University of.	10,795	--	12,000	--	12,000	--
North Carolina State University.	251,030	2	276,000	2	276,000	2
Oklahoma, State of	15,937	--	17,000	--	17,000	--
Oklahoma State University.	12,500	--	14,000	--	14,000	--
Pennsylvania, State of.	12,476	--	14,000	--	14,000	--
Pennsylvania State University.	13,468	--	15,000	--	15,000	--
Purdue University.	40,319	--	44,000	--	44,000	--
Rice Research Board.	500,000	4	550,000	4	550,000	4

Available Funds and Staff Years
2000 Actual and Estimated 2001 and 2002

Item	2000 Actual		2001 Estimated		2002 Estimated	
	Amount	Staff Years	Amount	Staff Years	Amount	Staff Years
Non- Federal Funds: (continued)						
Simplot Soil Builders	17,622	--	19,000	--	19,000	--
South Carolina Foundation Seed Association	16,302	--	18,000	--	18,000	--
Texas, State of	32,069	--	35,000	--	35,000	--
Texas, University of	98,126	1	108,000	1	108,000	1
United Soybean Board	91,886	1	101,000	1	101,000	1
Utah State University	43,041	--	47,000	--	47,000	--
Vermont, University of	10,626	--	12,000	--	12,000	--
Washington State University	55,147	--	61,000	--	61,000	--
Washington Tree Fruit Commission	15,000	--	17,000	--	17,000	--
Water Environment Research Foundation	64,554	--	95,000	--	95,000	--
Misc, Non-Federal Funds	391,103	--	2,088,000	--	2,088,000	--
Miscellaneous Contributed Funds:	20,045,220	117	23,000,000	117	23,000,000	117
Total, Agricultural Research Service	$952,971,341	7,760	$1,074,622,000	8,136	$1,032,053,000	8,136

AGRICULTURAL RESEARCH SERVICE

Permanent Positions by Grade and Staff-Year Summary
2000 Actual and Estimated 2001 and 2002

Grade	2000 Actual			2001 Estimate			2002 Estimate		
	Head-quarters	Field	Total	Head-quarters	Field	Total	Head-quarters	Field	Total
ES-6	1	1	2	1	1	2	1	1	2
ES-5	2	2	4	2	2	4	2	2	4
ES-4	2	7	9	2	7	9	2	7	9
ES-3	2	11	13	2	11	13	2	11	13
ES-2	1	5	6	1	5	6	1	5	6
ES-1	--	3	3	--	3	3	--	3	3
GS/GM-15	52	476	528	52	476	528	52	476	528
GS/GM-14	44	554	598	44	554	598	44	554	598
GS/GM-13	102	593	695	102	668	770	102	668	770
GS-12	99	634	733	99	759	858	99	759	858
GS-11	27	538	565	27	515	542	27	515	542
GS-10	1	15	16	1	15	16	1	15	16
GS-9	31	818	849	31	818	849	31	818	849
GS-8	18	349	367	18	349	367	18	349	367
GS-7	50	656	706	50	731	781	50	731	781
GS-6	46	530	576	46	580	626	46	580	626
GS-5	25	360	385	25	410	435	25	410	435
GS-4	12	91	103	12	91	103	12	91	103
GS-3	3	31	34	3	31	34	3	31	34
GS-2	2	20	22	2	20	22	2	20	22
GS-1	1	3	4	1	3	4	1	3	4
Other Graded Positions.....	5	51	56	5	51	56	5	51	56
Ungraded Positions.....	1	519	520	1	519	520	1	519	520
Total Permanent Positions.....	527	6,267	6,794	527	6,619	7,146	527	6,619	7,146
Unfilled Positions end-of-year.....	-48	-176	-224	-48	-210	-258	-48	-210	-258
Total Permanent Full-Time Employment, end-of-year.....	479	6,091	6,570	479	6,409	6,888	479	6,409	6,888
Staff Year Ceiling.....	499	7,261	7,760	499	7,637	8,136	499	7,637	8,136

AGRICULTURAL RESEARCH SERVICE

Classification by objects
2000 Actual and Estimated 2001 and 2002
(Dollars in thousands)

		2000	2001	2002
Personnel Compensation:				
Headquarters		$69,970	$71,782	$73,661
Field		308,137	342,778	360,008
11	Total personnel compensation	378,107	414,560	433,669
12	Personnel benefits	90,022	98,779	103,559
13	Benefits for former employees:	--	--	--
	Total pers. comp. & benefits	468,129	513,339	537,228
Other Objects:				
21	Travel	14,973	16,965	16,479
22	Transportation of things	1,264	1,421	1,340
23.1	Rent payments to GSA	20	--	--
23.2	Rent paid to others	1,700	1,933	1,824
23.3	Communications, utilities and misc. charges	32,053	35,516	34,012
24	Printing and reproduction	1,178	1,324	1,250
25.1	Advisory and assistance services	316	316	316
25.2	Other services	31,576	44,434	42,245
25.3	Purchases of goods and services from Government Accounts	4,157	4,602	4,535
25.4	Operation and maintenance of facilities	20,163	22,561	21,273
25.5	Research and development contracts	117,583	141,874	125,495
25.6	Medical care	167	187	187
25.7	Operation and maintenance of equipment	5,450	6,129	5,780
25.8	Subsistence and support of persons	1,249	1,469	1,406
26	Supplies and materials	83,438	85,400	84,152
31	Equipment	37,145	42,458	41,744
32	Land and structures	14,940	23,138	22,473
41	Grants, subsidies, and contributions	21,564	26,552	22,552
	Total other objects	388,936	456,279	427,063
Total direct obligations		857,065	969,618	964,291
Position Data:				
Average Salary, ES positions		$122,545	$128,439	$134,476
Average Salary, GS positions		$52,656	$55,189	$57,783
Average Grade, GS positions		10.0	10.0	10.0
Average Salary of Ungraded positions		$33,741	$35,374	$37,037

Note: Includes Salaries and Expenses and Buildings and Facilities Obligations.

AGRICULTURAL RESEARCH SERVICE

PASSENGER MOTOR VEHICLES

The Agricultural Research Service (ARS) passenger motor vehicle fleet is almost exclusively used by professional research investigators and technical personnel. In the course of their daily work, research personnel may need to travel to individual farms, ranches, commercial firms, State agricultural experiment stations, research fields, etc. A high degree of mobility is necessary in this type of work. Using common carriers is not feasible. Comparative studies of cost requirements involved when using private and Government vehicles show that it is more economical to have Government vehicles available than it is for reimbursement for using privately-owned vehicles.

It is ARS policy to pool the use of motor vehicles for different activities in order to keep the number of vehicles to a minimum and reduce the overall operation and maintenance costs. The agency requires vehicle operational reports and makes periodic surveys to determine the extent that vehicles are being used and their condition.

Replacement of passenger motor vehicles. ARS proposes to replace 46 of the 377 passenger vehicles currently in operation. These vehicles are assigned throughout ARS locations and are used in conjunction with research studies and technical assistance. Vehicle replacement is based on funding priority, program management, vehicle mileage, and vehicle age. Federal regulations establish the minimum replacement standards that allow Agencies to replace passenger vehicles when the vehicle is 3 years of age or has 60,000 miles. Agencies can retain vehicles that meet the minimum replacement standards if the vehicle can be operated without excessive maintenance costs or substantial reduction in resale value. All vehicles proposed for replacement have a mileage of 60,000 or more miles.

Age and mileage data for passenger motor vehicles on hand as of September 30, 2000 are as follows:

Age Data			Mileage Data		
Age-Year Model	Number of Vehicles	Percent of Total	Lifetime Mileage (thousands)	Number of Vehicles	Percent of Total
1995	228	61	Over 100	12	3
1996	21	6	80-100	34	9
1997	29	8	60-80	116	31
1998	32	8	40-60	69	18
1999	35	9	20-40	72	19
2000	32	8	Under 20	74	20
Total	377	100	Total	377	100

AIRCRAFT

ARS currently maintains a fleet of six aircraft which are located at College Station and Weslaco, Texas. These aircraft have been specially modified and equipped for research for pest control methods, application of agricultural materials, radar tracking of airborne insect migration, infrared and color photography, and evaluating effects of weather on agriculture.

There are no planned replacements for these aircraft.

AGRICULTURAL RESEARCH SERVICE

Proposed Language Changes

The estimates include appropriation language for this item as follows (new language underscored; deleted matter enclosed in brackets):

Salaries and Expenses:

For necessary expenses to enable the Agricultural Research Service to perform agricultural research and demonstration relating to production, utilization, marketing, and distribution (not otherwise provided for); home economics or nutrition and consumer use including the acquisition, preservation, and dissemination of agricultural information; and for acquisition of lands by donation, exchange, or purchase at a nominal cost not to exceed $100, and for land exchanges where the lands exchanged shall be of equal value or shall be equalized by a payment of money to the grantor which shall not exceed 25 percent of the total value of the land or interests transferred out of Federal ownership, [$898,812,000] $915,591,000: Provided, That appropriations hereunder shall be available for temporary employment pursuant to the second sentence of section 706(a) of the Organic Act of 1944 (7 U.S.C. 2225), and not to exceed $115,000 shall be available for employment under 5 U.S.C. 3109: Provided further, That appropriations hereunder shall be available for the operation and maintenance of aircraft and the purchase of not to exceed one for replacement only: Provided further, That appropriations hereunder shall be available pursuant to 7 U.S.C. 2250 for the construction, alteration, and repair of buildings and improvements, but unless otherwise provided, the cost of constructing any one building shall not exceed $375,000, except for headhouses or greenhouses which shall each be limited to $1,200,000, and except for 10 buildings to be constructed or improved at a cost not to exceed $750,000 each, and the cost of altering any one building during the fiscal year shall not exceed 10 percent of the current replacement value of the building or $375,000, whichever is greater: Provided further, That the limitations on alterations contained in this Act shall not apply to modernization or replacement of existing facilities at Beltsville, Maryland: Provided further, That appropriations hereunder shall be available for granting easements at the Beltsville Agricultural Research Center, including an easement to the University of Maryland to construct the Transgenic Animal Facility which upon completion shall be accepted by the Secretary as a gift: Provided further, That the foregoing limitations shall not apply to replacement of buildings needed to carry out the Act of April 24, 1948 (21 U.S.C. 113a): Provided further, That funds may be received from any State, other political subdivision, organization, or individual for the purpose of establishing or operating any research facility or research project of the Agricultural Research Service, as authorized by law.

None of the funds in the foregoing paragraph shall be available to carry out research related to the production, processing or marketing of tobacco or tobacco products.

In fiscal year [2001] 2002, the agency is authorized to charge fees, commensurate with the fair market value, for any permit, easement, lease, or other special use authorization for the occupancy or use of land and facilities (including land and facilities at the Beltsville Agricultural Research Center) issued by the agency, as authorized by law, and such fees shall be credited to this account, and shall remain available until expended for authorized purposes.

AGRICULTURAL RESEARCH SERVICE

Lead-Off Tabular Statement

SALARIES AND EXPENSES - CURRENT LAW

Appropriations Act, 2001		$898,812,000 a/
Budget Estimate, 2002		915,591,000
Increase in Appropriation		+16,779,000
Adjustments in 2001:		
Appropriations Act, 2001	$898,812,000	
Rescission under P.L. 106-554 b/	-1,977,000	
Adjusted Base for 2001		$896,835,000
Budget Estimate, 2002		915,591,000
Increase above Adjusted 2001		+18,756,000

a/ The amount excludes $128,716 transferred from Congreesional Relations.
b/ The amount is rescinded pursuant to Section 1(a) (4) of P.L. 106-554.

AGRICULTURAL RESEARCH SERVICE

SUMMARY OF INCREASES AND DECREASES
(On basis of appropriation)

Item of Change	2001 Estimated	Pay Costs	Program Changes	2002 Estimated
Research on Soil, Water, and Air Sciences	$92,051,000	+$2,147,000	-$4,169,000	$90,029,000
Research on Plant Sciences	326,432,000	+7,629,000	-9,249,000	324,812,000
Research on Animal Sciences	142,774,000	+3,514,000	+801,000	147,089,000
Research on Commodity Conversion and Delivery	185,508,000	+3,940,000	+12,817,000	202,265,000
Human Nutrition Research	75,266,000	+673,000	-200,000	75,739,000
Integration of Agricultural Systems	37,121,000	+484,000	--	37,605,000
Agricultural Information and Library Services	19,461,000	+369,000	--	19,830,000
Repair and Maintenance of Facilities	18,222,000	--	--	18,222,000
Total Available	896,835,000	+18,756,000	0	915,591,000

Project Statement - Current Law
(On basis of appropriation)

	2000 Actual		2001 Estimated		Increase or Decrease	2002 Estimated	
	Amount	Staff Years	Amount	Staff Years		Amount	Staff Years
1. Research on Soil, Water and Air Sciences	$87,288,458	890	$92,051,000	931	-$2,022,000 (1)	$90,029,000	914
2. Research on Plant Sciences	289,797,633	3,153	326,432,000	3,310	-1,620,000 (2)	324,812,000	3,253
3. Research on Animal Sciences	134,900,344	1,452	142,774,000	1,524	+4,315,000 (3)	147,089,000	1,530
4. Research on Commodity Conversion and Delivery	174,576,916	1,626	185,508,000	1,709	+16,757,000 (4)	202,265,000	1,777
5. Human Nutrition Research	71,417,829	280	75,266,000	292	+473,000 (5)	75,739,000	292
6. Integration of Agricultural Systems	31,741,258	199	37,121,000	210	+484,000 (6)	37,605,000	210
7. Agricultural Information and Library Services	19,405,335	160	19,461,000	160	+369,000 (7)	19,830,000	160
8. Repair and Maintenance of Facilities	18,230,114	--	18,222,000	--	--	18,222,000	--
9. Collaborative Research Program	5,000,000 a/	--	--	--	--	--	--
10. Unobligated balance	3,155,113	--	--	--	--	--	--
Total, Available or Estimate	835,513,000	7,760	896,835,000	8,136	+18,756,000	915,591,000	8,136
Transfer from Office of Congressional Relations	-129,000	--	--	--			
Transfer from Agency for Int'l. Development (AID)	-5,000,000 a/	--	--	--			
Rescission	3,938,000	--	1,977,000	--			
Total Appropriations	834,322,000	7,760	898,812,000	8,136			

a/ Collaborative Research Program Funds from AID are designated as no-year funds. $4,505 was obligated in FY 2000, leaving a balance of $4,995,495 available for obligation in FY 2001.

Agricultural Research Service: FY 2002 Proposed Budget Increases by ARS Objective

New Areas of Emphasis	Soil, Water, & Air Sciences	Plant Sciences	Animal Sciences	Commodity Conversion & Delivery	Human Nutrition	Integration of Agricultural Systems	Information & Library	Total Increase
• Emerging & Exotic Diseases/Pests		1,782,000	5,000,000					6,782,000
• Biotechnology Risk Assessment		3,000,000						3,000,000
• Agricultural Genomes/Bioinformatic Tools		2,085,000	2,415,000					4,500,000
• Invasive Species (Weeds/Pests)		5,000,000						5,000,000
• Biobased Products and Bioenergy				15,000,000				15,000,000
TOTAL		11,867,000	7,415,000	15,000,000				**$34,282,000**

Note: Table does not include $18,756,000 for salary and increased operating costs.

AGRICULTURAL RESEARCH SERVICE

PROPOSED INCREASES AND DECREASES–PROGRAMS

OBJECTIVE 1: SOIL, WATER, AND AIR SCIENCES

1) A decrease of $2,022,000 for research on Soil, Water, and Air Sciences consisting of:

a) An increase of $2,147,000 for the anticipated FY 2002 pay raise.

These funds are critical to support an effective and responsive USDA in-house research capability. Absorption of the pay costs would result in further erosion of the Agency's capacity to maintain viable research programs. Absorption of these costs ultimately reduces the number of scientists and support personnel and operating funds essential to carry out national research priorities.

As a percentage of total obligations, costs related to employee compensation will account for about 56 percent of total ARS spending in 2002, compared to about 53 percent estimated for 2001. If funds for increased pay costs are not provided, ARS would need to reduce spending in all non-pay areas by about 4.5 percent to make up the difference. Coupled with increasing inflationary costs not requested in the budget, a cut in appropriations for pay costs would cause an additional reduction in the ARS budget for equipment and supplies needed to carry out the national research program.

b) A decrease of $4,169,000 for projects to be funded in FY 2001 in Soil, Water, and Air Sciences research to provide savings to finance higher priority research initiatives.

The budget recommends that all of the research projects which were added to the FY 2001 appropriations be discontinued in 2002. The Administration believes taxpayer dollars must be spent on the highest priority needs of national significance. The savings achieved will be redirected to finance such high priority agricultural research initiatives as recommended in the President's budget.

The projects recommended for elimination under this Objective are:

-- Conservation Research
-- Mid-West/Mid-South Irrigation Research
-- National Sedimentation Laboratory Acoustics Research
-- National Sedimentation Laboratory Yazoo Basin
-- National Soil Dynamics Research
-- Northeast Plant, Soil, and Water Research
-- Pasture Systems and Watershed Management (Microbial Pathogens in Small Watersheds)
-- Soil Tilth Research
-- Waste Management Research
-- Water Use Management Technology
-- Watershed Research
-- Western Grazinglands Research

OBJECTIVE 2: PLANT SCIENCES

1) A decrease of $1,620,000 for research on Plant Sciences consisting of:

a) An increase of $7,629,000 for the anticipated FY 2002 pay raise.

These funds are critical to support an effective and responsive USDA in-house research capability. Absorption of the pay costs would result in further erosion of the Agency's capacity to maintain viable research programs. Absorption of these costs ultimately reduces the number of scientists and support personnel, and operating funds essential to carry out national research priorities.

As a percentage of total obligations, costs related to employee compensation will account for about 56 percent of total ARS spending in 2002, compared to about 53 percent estimated for 2001. If funds for increased pay costs are not provided, ARS would need to reduce spending in all non-pay areas by about 4.5 percent to make up the difference. Coupled with increasing inflationary costs not requested in the budget, a cut in appropriations for pay costs would cause an additional reduction in the ARS budget for equipment and supplies needed to carry out the national research program.

b) An increase of $1,782,000 for research in support of **Emerging and Exotic Diseases and Pests of Plants.**

Explanation of Change.

Exotic and emerging plant diseases pose severe problems throughout the U.S. Their increasing importance may be attributed to the introduction of pathogens into new geographic regions; modification of the environments that favor disease; changes in crop management practices; genetic shifts in pathogen populations; and other processes that may give them a competitive advantage. Recent examples include the identification of the plum pox virus in Pennsylvania which threatens the $1.8 billion U.S. stone fruit industry, and the glassy-winged sharpshooter "super" vector of Pierce's disease that threatens the $33 billion California vine industry. Accurate taxonomic identification and classification of such pathogens are essential for providing effective control.

It is extremely important to identify new or previously unknown pathogens, determine their geographic origin, and biologically characterize them. Continued development of pathogen detection, exclusion, and quarantine treatment technologies is important both for keeping new diseases from becoming established in the U.S. and in treating crops and commodities so they can be shipped and sold in other markets throughout the world.

Research and development of new disease management technologies, particularly biologically-based ones such as host-plant resistance, biological and cultural controls, and others must be expanded. Research on integration of different control technologies into effective, economical, and sustainable integrated disease management systems should be conducted so that practical solutions of problems can be transferred to agricultural producers, processors, land managers, and others.

Outcomes

The proposed research on emerging and exotic plant diseases will enable U.S. farmers to provide abundant, healthful food. New, more rapid detection and control strategies will provide short-term solutions while long-term solutions will be made available via development of resistant germplasm and more sustainable, environmentally friendly, biologically based control strategies.

ARS research in these areas supports Performance Goal 1.1.2.1: demonstrate techniques to control or eliminate postharvest insects and diseases, and increase market quality and product longevity; Performance Goal 1.1.2.3: new and improved diagnostic tests are developed and available; Performance Goal 2.1.2.1: demonstrate new integrated technologies to protect plants, animals, and ecosystems; Performance Goal 2.1.3.1: collections of well-documented germplasm of importance to U.S. agricultural security are readily available to scientists and breeders for research and development; Performance Goal 2.1.3.3: release of improved germplasm, varieties, and breeds based on effective use of genetic resources; Performance Goal 2.1.3.4: improve methods for identifying useful properties of plants, animals, and other organisms, and for manipulating the genes associated with these properties; Performance Goal 2.2.1.1: transfer knowledge

developed by ARS to industry and regulatory agencies; and Performance Goal 4.3.1.1: deliver integrated pest management strategies that are cost effective and protect natural resources, human health, and the environment.

Specific Program Thrust

- **Rapidly Identify, Prevent, and Control Emerging and Exotic Plant Diseases** ($1,782,000). Effective plant disease control depends on accurate and timely identification of the pathogens involved and understanding pathogen/vector relations. Plum Pox, Pierce's disease and its vector the glassy-winged sharpshooter, karnal bunt, and soil-borne and foliar diseases of vegetables, sugar beets, cotton and soybean will be targeted. More sensitive and accurate methods of pathogen identification and detection are needed to safeguard domestic crop production, preserve export markets, and prevent the accidental introduction of exotic pathogens. Improved methods of biological control are needed to help replace or supplement the use of synthetic pesticides. Research is needed to improve the efficacy of biological control agents through genetic selection and bioengineering, assess the influence of weather, soil type, pesticide application, and crop variety on the reliability of biological control, and develop commercially feasible methods to mass produce, store, and apply biological control agents. To identify potential points of control, research is needed on the biology of pathogens, their relationship with host plants, how they move in the field and during commodity storage, and how they survive from season to season. In addition, research is needed on improving genetic resistance to diseases in plants including identifying and characterizing resistance and the associated genes, and incorporating resistance into plants through conventional breeding and genetic engineering.

c) An increase of $3,000,000 for research in support of **Biotechnology Risk Assessment.**

Explanation of Change.

In April 2000, the National Academy of Sciences issued a report, entitled "Genetically Modified Pest-Protected Plants." This report describes some long term concerns about the large scale deployment of pest resistant crops, especially genetically engineered ones. New ARS research will provide data about the long term ecological impacts of such crops, emphasizing those identified by the National Academy. The data will provide a basis for regulation of genetically engineered crops, especially those incorporating pest and herbicide resistance, including corn, cotton, sorghum, and soybeans. Processes to be emphasized are resistance management in pest populations, ecology of nontarget species that might be at risk, and economic analysis and international cooperation on risk assessment. For crops in which gene transfer is deemed most likely and potentially most damaging, technologies will be developed to mitigate the risk. These can include biotech approaches that prevent pollen or seedling viability, establishment of "buffer zones" or management practices to reduce risk, or other new technologies as appropriate.

Outcomes

The proposed research will provide early identification of the potential risks in deploying biotech crops, and data sets that can be used by regulatory agencies to assess risk and apply science-based management. This research will lead to a reduced risk of gene transfer from biotech crops to other species and improved health properties of biotech food products. It will also result in the development of varieties with reduced health risks to humans.

ARS research in these areas supports Performance Goal 2.1.2.1: demonstrate new integrated technologies to protect plants, animals, and ecosystems, and Performance Goal 4.2.1.1: risk-reduction strategies and methods transferred to the nation's agricultural industry.

Specific Program Thrusts

- **Develop Risk Assessment Strategies for Pest and Disease Tolerant Transgenic Plants** ($1,200,000).
  Ecological and quantitative genetic approaches to pest protected transgenic crops will focus on two

areas of concern: preventing the buildup of resistant pest populations, and minimizing effects on nontarget species. The models currently used by EPA to predict resistance buildup will be updated to deal with real world complexities (e.g., presence of two plant pests with differing susceptibilities to the resistance factor) and their underlying assumptions. New strategies for preventing resistance buildup will be developed based on the new information and then tested. The means of increasing the specificity of pest resistance in crops will be explored and developed including limiting the spatial or temporal expression of resistance to only the times and places where target pests are likely to strike, rather than in all tissues at all times.

- **Assess the Risks of Lateral Gene Transfer in the Environment** ($600,000). Experiments and long term monitoring will determine the actual risk of transferring foreign genes from genetically engineered crop plants to closely related weed species and will estimate the degree to which the genes alter the fitness of the weed species to their environment. Strategies will be developed to minimize the risks when gene transfer is found to be both possible and capable of altering plant fitness for the environment.

- **Decrease Allergens and Increase Nutritional Qualities of Biotech Food Products** ($1,200,000). Some individuals cannot benefit from the improved health properties of soybean proteins because of their sensitivity to allergens produced these proteins. Biotechnological approaches will be used to detect and remove those allergenic proteins. Research based on biotechnological methods for enhanced nutritional qualities of vegetables will be coupled with detailed studies defining changes in metabolic pathways (pleitrophic effects) to ensure the absence of associated undesirable/unsuspected changes.

d) An increase of $2,085,000 for research in support of **Bioinformatic Tools and Databases to Support Genomics Research.**

Explanation of Change.

More rapid and efficient methods are needed to characterize, identify, and manipulate useful properties of genes and genomes. Current methods, collectively termed "genomics," rely on ever more detailed, accurate, and comprehensive knowledge of genomic organization to efficiently characterize genes and elucidate their function. Genomics and biotechnology are critical for: developing improved crops that enable producers to maximize yields of high quality products, while minimizing environmental degradation and production costs; improving the efficiency of production; improving the accuracy of genetic selection, identifying and moving genes into plant populations, and identifying the genes responsible for disease and parasite resistance in plants; and increasing genetic analysis of both pathogenic and beneficial microorganisms, generating data on important virulence genes, determining how theses genes may either be utilized or controlled for disease prevention in plants, and producing new agriculturally important microbial gene products.

In order to facilitate more efficient use of time and resources, programs need to be established for the collection and handling of sequence information, and the identification and characterization of genes of agricultural importance. Support for the recently purchased high throughput sequencing (HTS) instruments needs to be expanded to fully serve ARS. Additionally, adaptation and development of novel bioinformatics systems and software to handle and analyze the data generated will be crucial to rapid dissemination of data.

Outcomes

The proposed research will provide the means for maintaining and enhancing the quality and safety of the U.S. supply of food, fiber, feed, medicines, biofuels, industrial products, and ornamentals. Agricultural competitiveness of the U.S. in global markets will be increased by: ensuring the continued genetic improvement of crops; assuring a plentiful supply of bees and other insect pollinators of crops; shielding crops and beneficial insects from genetic vulnerability caused by an inadequate supply of genetic diversity;

increasing genetic knowledge of pathogenic and beneficial microorganisms in plants; and enhancing production of new agriculturally important microbial gene products. Software tools and databases to utilize data derived from genome sequencing of plants and microbes of agricultural importance, a prerequisite for expeditiously applying this newly derived information to ongoing research programs, will be developed. Bioinformatic tools to link ARS genomics research programs to major national and international genome programs will also be developed. Research will develop and translate genomics information from model plant species and apply it to agriculturally important plants.

ARS research in these areas supports Performance Goal 1.1.2.1: demonstrate techniques to control or eliminate postharvest insects and diseases, and increase market quality and product longevity; Performance Goal 1.1.3.1: demonstrate postharvest technologies that add value and improve quality; Performance Goal 2.1.3.1: collections of well-documented germplasm of importance to U.S. agricultural security are readily available to scientists and breeders for research and development; Performance Goal 2.1.3.2: documented DNA base sequences of agricultural importance; Performance Goal 2.1.3.3: release of improved germplasm, varieties, and breeds based on effective use of genetic resources; Performance Goal 2.1.3.4: improve methods for identifying useful properties of plants, animals, and other organisms, and for manipulating the genes associated with these properties; and Performance Goal 2.1.4.1: make technologies available for improving productivity, safety, quality, and the security of the agricultural production system.

Specific **Program Thrust**

- **Bioinformatics and Databases** ($2,085,000).
  Storing, analyzing, and interpreting genomic and functional information is an essential component of the genomics program. This program will develop bioinformatic tools and provide database support for the entire ARS plant research program. Additional databases will be developed and curated to store sequence, mapping and functional genomics data for plants. Bioinformatic tools will be developed to analyze and interpret information from different databases and compare information within and across species. Bioinformatic tools and the large quantity of data that will be stored in the databases will provide a quantum leap in developing new technologies and information needed to address current and future agricultural problems.

e) An increase of $5,000,000 for research in support of **Invasive Species (Control of Weeds/Arthropods).**

Explanation of Change.

Invasive weeds and other pests species cost the United States over $122 billion per year. Invasive species impact production agriculture, including organic farming, and small farms, and are second only to loss of habitat causing negative impacts on environmental areas and loss of biological diversity. There are more than 30,000 invasive pest species in the United States, many of them undescribed, and the number is growing.

Weeds such as leafy spurge, melaleuca, old world climbing fern, giant salvinia, salt cedar, hydrilla, waterhyacinth, yellow starthistle, downy brome, Brazilian pepper, jointed goat grass, purple loosestrife, and many others infest at least 100 million acres in the United States which increase 8 to 20 percent annually. These aggressive, destructive pests are extremely difficult to control, especially in the west where public and private land boundaries often follow checkerboard patterns and control actions are difficult to coordinate. Weeds result in a reduction of about 12 percent in crop yields, or about $36 billion annually; 20 percent of forage yields, or about $2 billion annually; and $100 million is spent on aquatic weed control annually. About half of the threatened and endangered plant species in the United States are primarily at risk because of invasive weeds. In 1996, USDA approved a *Strategic Plan for Invasive and Noxious Weeds* to help coordinate activities. In 1997, a *National Strategy for Invasive Plant Management* was approved by over 100 public and private groups, including USDA. ARS has implemented a similar strategic plan for weed management.

Arthropods (insects and mites) such as glassy-winged sharpshooter, silverleaf whitefly and other whiteflies, Asian longhorned beetle, Russian wheat aphid, and many others are high priority targets for integrated pest management. Arthropod pests destroy 13 percent of crop production each year, costing about $36 billion, with invasive arthropods causing about $14 billion of this total. Another $1.5 billion annually is lost to lawn and garden pests. Like weeds, new arthropod pests appear in the United States each year.

Outcomes

Some of the proposed research is in support of action agencies such as the Animal and Plant Health Inspection Service. This research will result in greater exclusion of potential invasive species, quicker detection, and more effective eradication of new invading species. It will also result in more efficient long term management of established invasive species. These improvements will result from emphasizing systematics, biologically-based integrated pest management, and ecosystem management.

ARS research in these areas supports Performance Goal 1.1.1.1: Demonstrate and transfer to users integrated systems; Performance Goal 1.1.2.3: New and improved diagnostic tests are developed and available; Performance Goal 2.1.2.1: Demonstrate new integrated technologies to protect plants, animals, and ecosystems; Performance Goal 2.2.1.1: Transfer knowledge developed by ARS to industry and regulatory agencies; and Performance Goal 4.3.1.1: deliver integrated pest management strategies that are cost-effective and protect natural resources, human health and the environment.

Specific Program Thrusts

- **Develop Internet-Based Information Resources for Invasive Species** ($300,000).
  An Internet-based information management system will be compiled at the National Agricultural Library (NAL), accessible through www.invasivespecies.gov, with connections to the eight Federal departments and agencies responsible for the exclusion, eradication, and control of invasive species. This resource will assist policymakers, regulators, and researchers to coordinate cross cutting programs, identify program gaps, and facilitate the implementation of the National Invasive Species Management Plan that was recently adopted by the National Invasive Species Council.

- **Conduct Systematics of Invasive Insects and Weeds** ($800,000).
  Agricultural systematics is the classification (i.e., identification and relationship) of economically important plants, insects, fungi,etc. Correct identification of these organisms allows early detection of invasive species and identification of close relatives as candidates for biological control of noxious weeds and pests. Systematics research will be conducted on pathogens as potential biological control agents for major invasive weeds, and plant- and animal-feeding mites used in biological control of invasive species, and whitefly pests.

- **Provide Support for Foreign Biological Control Laboratories** ($600,000).
  Explorations will be conducted to find natural enemies of key arthropod and weed species in Europe, Africa, South America, and Australasia for biological control programs of arthropods (i.e., Asian longhorned beetle, olive and other fruit flies, pink hibiscus mealybug, glassy-winged sharpshooter, imported fire ant and other species) and weeds (i.e., Russian knapweed, mustard spp., leafy spurge, thistles, giant reed, saltcedar, waterhyacinth, tropical soda apple, kudzu, mile-a-minute, melaleuca, old world climbing fern, and other species).

- **Develop Methods for Controlling Invasive Weeds and Arthropod Pests of Plants and Animals** ($2,100,000).
  Classical and augmentative biological control approaches will be developed (using parasites, predators and pathogens) for managing invasive weed and arthropod species. The National Fungal Collection at Ithaca and other pathogen collections will be evaluated for agents that are active against invasive arthropod and weed species. Research will also develop: genetic methods for controlling arthropods and weeds by altering their natural flora or by manipulating their gene pool; methods for delivery of biological control agents for invasive weed and arthropod species; integrated weed management

systems for use on small farms and organic farms; farm level and remote sensing systems that are appropriately scaled (and will thus be adopted by farmers and growers) for invasive arthropod and weed species; and the database of natural enemy importations as the National Biological Control Documentation Center.

- **Detect, Interdict, and Develop Areawide IPM Pilot Tests for Invasive Insects and Weeds** ($1,200,000).
  Automated systems for detection of arthropods and weeds will be developed to enable more rapid identification and interdiction and control of potentially invasive species. Semiochemical lures will be isolated and developed for use by APHIS in constructing traps for detecting and monitoring key invasive arthropod species. IPM pilot tests on Asian longhorned beetle, glassy-winged sharpshooter, pink hibiscus mealybug, olive fruit fly and oriental apple moth will be initiated in preparation for an areawide management approach for these pests. Areawide IPM pilot tests for key invasive arthropods and weeds will also be developed.

f) A decrease of $21,116,000 for projects to be funded in FY 2001 in Plant Sciences research to provide savings to finance higher priority research initiatives.

The budget recommends that all of the research projects which were added to the FY 2001 appropriations be discontinued in 2002. The Administration believes taxpayer dollars must be spent on the highest priority needs of national significance. The savings achieved will be redirected to finance such high priority agricultural research initiatives as recommended in the President's budget.

The projects recommended for elimination under this Objective are:

--Alternative Crops and Value Added Products Research
--Appalachian Pasture-Based Beef Systems
--Arctic Germplasm Research
--Bee Research
--Biological Controls and Agricultural Research
--Biomedical Materials in Plants
--Cereal Crops Research
--Cereal Crops, Northern Crops Research
--Citrus/Horticultural Research
--Coffee and Cocoa Research
--Corn Resistant to Aflatoxin for the Mid-South
--Ecology of Tamarix
--Endophyte Research
--Floriculture/Nursery Crops Research
--Golden Nematode
--Grain Legume Plant Pathologist Position
--Grain Research
--Grape Rootstock Research
--Greenhouse and Hydroponics Research
--Greenhouse Lettuce Germplasm Research
--Integrated Farming Systems/Dairy Forage Research
--IPM for Northern Climate Crops
--Lettuce Geneticist/Breeder Position
--National Wheat and Barley Scab Initiatives (Fusarium Head Blight)
--Nematology Research
--Organic Minor Crop Research
--Potato Research Enhancement
--Rangeland Resource Management

--Red Imported Fire Ants Research
--Rice Research
--Risk Assessment for Bt. Corn
--Root Diseases in Wheat and Barley
--Small Farms Research
--Small Fruits Research
--Soybean Cyst Nematode Research
--Soybean Genetics
--Soybean Research in the South
--Sustainable Vineyard Practices Position
--Temperate Fruit Flies
--Turfgrass Research
--U.S. Pacific Basin Agricultural Research
--U.S. Plant Stress and Water Conservation Research
--Viticulture Research

OBJECTIVE 3: ANIMAL SCIENCES

1) An increase of $4,315,000 for research on Animal Sciences consisting of:

a) An increase of $3,514,000 for the anticipated FY 2002 pay raise.

These funds are critical to support an effective and responsive USDA in-house research capability. Absorption of the pay costs would result in further erosion of the Agency's capacity to maintain viable research programs. Absorption of these costs ultimately reduces the number of scientists and support personnel, and operating funds essential to carry out national research priorities.

As a percentage of total obligations, costs related to employee compensation will account for about 56 percent of total ARS spending in 2002, compared to about 53 percent estimated for 2001. If funds for increased pay costs are not provided, ARS would need to reduce spending in all non-pay areas by about 4.5 percent to make up the difference. Coupled with increasing inflationary costs not requested in the budget, a cut in appropriations for pay costs would cause an additional reduction in the ARS budget for equipment and supplies needed to carry out the national research program.

b) An increase of $5,000,000 for research in support of **Emerging and Exotic Diseases and Pests of Animals.**

Explanation of Change.

Emerging diseases are caused by previously unidentified pathogens or new manifestations of "old" diseases that appear in animal populations. Reemergence of known diseases often occur after long quiescent periods or upon introduction of a new pathogen into a naive animal population in a new geographical area. Microbial pathogens are continually adapting to new ecological niches. Exotic pathogens and pests, once introduced into a new geographic area, can explode into an epidemic due to the absence of effective control measures such as vaccines, drugs, lack of resistance in host animals, and limited resources to effectively manage the spread of these pathogens. Modern efficient management practices based on intensive management practices and animal stock of narrow genetic diversity provide an environment in which there is a greater risk of severe animal disease outbreaks. In addition, the globalization of trade, increased international travel of people and movement of goods, and changing weather patterns provide new opportunities for the emergence and spread of infectious diseases such as bovine spongiform encephalopathy (BSE), also referred to as "mad cow disease" in Europe. BSE outbreaks in the United Kingdom and Europe have required the destruction of huge numbers of animals

to control the disease outbreaks, and have caused billions of dollars of economic loss due to domestic and international trade embargoes. Timely and effective control strategies are needed to maintain a safe food supply, avoid economic disruptions, and maintain consumer confidence in the ability of national governments to handle animal disease emergencies. Developing effective control strategies for animal diseases that have reservoirs in both domestic and wild animals requires a greater understanding of the mode of pathogen transmission and maintenance in alternative hosts.

Research to improve methods of rapid and accurate detection, and new means to control emerging and or exotic pathogen threats is urgently needed to prevent economic losses and maintain animal well-being. This proposed research initiative will develop rapid, specific, and sensitive pathogen detection methods and new disease control strategies based on microbial genomics and increased emphasis on enhancing immune capacity. Genomics research holds the promise of providing new insight into microbial virulence and pathogenesis, host range factors, evolution, and new and better diagnostics, vaccines, and therapeutics. A new understanding of the host animal's immune response to these pathogens will enable researchers to develop more rational, new disease control strategies for the future.

Outcomes

The proposed research on emerging and exotic animal diseases will enable U.S. farmers to provide safer and more economical food. The research will provide better immunodiagnostics, vaccines, and therapeutics against pathogens. It will improve food safety, decrease drug and pesticide use, improve disease control by using host genetics and transgenic technologies, improve nutrition for disease resistance, decrease trade barriers, and provide rapid response to outbreaks of emerging and exotic animal disease. Specifically, one outcome will be improved diagnostics for feed contaminants to support the current ban on ruminant protein feeding. Another outcome will be more knowledge on the nature of organisms which will permit better diagnostics and control.

ARS research in this initiative supports Performance Goal 1.1.2.1: demonstrates techniques to control or eliminate postharvest insects and diseases, and increase market quality and product longevity; Performance Goal 1.1.2.3: new and improved diagnostic tests are developed and available; Performance Goal 2.1.2.1: demonstrate new integrated technologies to protect plants, animals and ecosystems; Performance Goal 2.1.3.1: collection of new documented germplasm of importance to U.S. agricultural security are readily available to scientists and breeders for research and development; Performance Goal 2.1.3.4: improve methods for identifying useful properties of plants, animals and other organisms, and manipulating the genes associated with these properties; Performance Goal 2.2.1.1: transfer knowledge developed by ARS to industry and regulatory agencies; and Performance Goal 4.3.1.1: deliver integrated pest management strategies that are cost effective and protect natural resources, human health, and the environment.

Specific Program Thrusts

- **Nature and Transmission of the BSE Agent** ($1,000,000).
  BSE is thought to be caused by an infectious protein fragment called a prion. Establishing the nature of the agent causing spongiform encephalopathy will lead to better management practices to safeguard against its spread and perhaps provide for early detection. Previous epidemiological evidence suggests that in some instances a vector and/or reservoir may be involved in the transfer of spongiform encephalopathy. Identifying previously unrecognized sources of infectivity and routes of transmission is therefore critical.

- **Detection and Diagnosis of BSE** ($3,000,000).
  There is a broad need for improved diagnostics related to the problem of spongiform encephalopathies. Detection of affected livestock prior to the onset of clinical disease (preharvest) is a priority, both to eradicate the disease and to prevent hazardous products from entering the human food chain. The criteria for a preharvest BSE diagnostic test must be quite stringent, since an error in diagnosis would have disastrous consequences for the U.S. livestock industry. Several diagnostic tests have been developed but none are sufficiently accurate for use in an area where BSE does not occur, such as the

U.S. Development and validation of tests must be preceded by careful generation of a set of samples (i.e., blood, serum, and other tissues) from cattle experimentally infected with BSE so that it is known exactly when and how the animals were infected. For preliminary test development, small amounts of this material are available from other countries but more material is required and will take about 36 months to generate in high-level biocontainment facilities. Other diagnostic tests are required for detection of BSE in dead animals and in products destined for human use (i.e., food, cosmetics, pharmaceuticals, etc.). To give producers a means to prevent the introduction of BSE into their herds, diagnostic tests for detection of ruminant material in feedstuffs and in the farm environment, thought to be a means for transmission of BSE, are required. Since susceptibility to related spongiform encephalopathies is partially determined by the genetics of the animal, tests to determine the prion genotype of U.S. cattle populations are required, both for epidemiologic surveillance and to estimate the risk of BSE in U.S. cattle populations.

- **Disposal ($1,000,000).**
  Methods based on engineering and biological studies need to be developed for environmentally friendly and inexpensive but safe disposal of carcasses and feedstuffs.

c) An increase of $2,415,000 for research in support of Bioinformatic Tools and Databases to Support Genomics Research.

Explanation of Change.

The U.S. agricultural system now faces formidable challenges such as: climatic extremes; water and soil pollution and degradation; environmental regulations which may rapidly complicate agricultural production and processing; new pests and pathogens; and extinction or inaccessibility of genetic resources, resulting in increased genetic vulnerability of crops, insects, and animals. These challenges can only be met by harnessing the inherent potential of genetic resources.

More rapid and efficient methods are required to characterize, identify, and manipulate useful properties of genes and genomes. Current methods, collectively termed "genomics," rely on ever more detailed, accurate, and comprehensive knowledge of genomic organization to efficiently characterize genes and elucidate their function. Genomics and biotechnology are critical for improving the efficiency of production, and the quality and safety of food products from animals; improving the accuracy of genetic selection, identifying and moving genes into livestock populations, and identifying the genes responsible for disease and parasite resistance in animals; and increasing genetic analysis of both pathogenic and beneficial microorganisms, generating data on important virulence genes, determining how theses genes may either be utilized or controlled for disease prevention in animals, and producing new agriculturally important microbial gene products.

In order to facilitate more efficient use of time and resources, programs need to be established for the collection and handling of sequence information, and the identification and characterization of genes of agricultural importance. Support for the recently purchased high throughput sequencing (HTS) instruments needs to be expanded to fully serve ARS. Additionally, adaptation and development of novel bioinformatics systems and software to handle and analyze the data generated will be crucial to rapid dissemination of data.

Outcomes

The proposed research will provide the means for using genomic information to maintain and enhance the quality, safety, and global competitiveness of U.S. animal-based food, fiber, feed, and industrial products. It will also ensure the continual genetic improvement of animals; shield animals from genetic vulnerability caused by an inadequate supply of genetic diversity; increase genetic knowledge of pathogenic and beneficial microbes; identify mechanisms for disease prevention in animals; develop diagnostic tests and therapeutic agents for new and emerging diseases; and enhance production of new, agriculturally important microbial products.

ARS research in these areas supports Performance Goal 1.1.2.1: demonstrate techniques to control or eliminate postharvest insects and diseases, and increase market quality and product longevity; Performance Goal 1.1.3.1: demonstrate postharvest technologies that add value and improve quality; Performance Goal 2.1.3.1: collections of well-documented germplasm of importance to U.S. agricultural security are readily available to scientists and breeders for research and development; Performance Goal 2.1.3.2: documented DNA base sequences of agricultural importance; Performance Goal 2.1.3.3: release of improved germplasm, varieties, and breeds based on effective use of genetic resources; Performance Goal 2.1.3.4: improve methods for identifying useful properties of plants, animals, and other organisms, and for manipulating the genes associated with these properties; and Performance Goal 2.1.4.1: make technologies available for improving productivity, safety, quality, and the security of the agricultural production system.

Specific Program Thrust

- **Bioinformatics and Databases** ($2,415,000).
  Storing, analyzing, and interpreting genomic and functional information is an essential component of a genomics program. This program will develop bioinformatic tools and provide database support for the entire ARS animal research program. Additional databases will be developed and curated to store sequence, mapping and functional genomics data for animals and microbes. Bioinformatic tools will be developed to analyze and interpret information from different databases and compare information within and across species. Bioinformatic tools and the large quantity of data that will be stored in the databases will provide a quantum leap in developing new technologies and information needed to address current and future agricultural problems.

d) A decrease of $6, 614, 000 for projects to be funded in FY 2001 in Animal Sciences research to provide savings to finance higher priority research initiatives.

The budget recommends that all of the research projects which were added to the FY 2001 appropriations be discontinued in 2002. The Administration believes taxpayer dollars must be spent on the highest priority needs of national significance. The savings achieved will be redirected to finance such high priority agricultural research initiatives as recommended in the President's budget.

The projects recommended for elimination under this Objective are:

--Animal Vaccines
--Aquaculture Initiative for Mid-Atlantic Highlands
--Aquaculture Fisheries Research
--Aquaculture Initiative, Harbor Branch Oceanographic Institute
--Aquaculture Systems (Rainbow Trout)
--Asian Bird Influenza
--Avian Pneumovirus
--Catfish Genome Research
--Malignant Catarrhal Fever (MCF) Virus
--Mosquito Trapping Research/West Nile Virus
--National Warmwater Aquaculture Research
--National Center for Cool and Cold Water Aquaculture Research
--Poultry Enteritis-Mortality Syndrome
--Poultry Diseases (Avian Coccidiosis/Leukosis-J Virus)

OBJECTIVE 4: COMMODITY CONVERSION AND DELIVERY

1) An increase of $16,757,000 for research on Commodity Conversion and Delivery consisting of:

a) An increase of $3,940,000 for the anticipated FY 2002 pay raise.

These funds are critical to support an effective and responsive USDA in-house research capability. Absorption of the pay costs would result in further erosion of the Agency's capacity to maintain viable research programs. Absorption of these costs ultimately reduces the number of scientists and support personnel, and operating funds essential to carry out national research priorities.

As a percentage of total obligations, costs related to employee compensation will account for about 56 percent of total ARS spending in 2002, compared to about 53 percent estimated for 2001. If funds for increased pay costs are not provided, ARS would need to reduce spending in all non-pay areas by about 4.5 percent to make up the difference. Coupled with increasing inflationary costs not requested in the budget, a cut in appropriations for pay costs would cause an additional reduction in the ARS budget for equipment and supplies needed to carry out the national research program.

b) An increase of $15,000,000 for research in support of Biobased Products and Bioenergy (New Uses).

Explanation of Change.

Federal efforts to accelerate the development of biobased industries that use trees, crops, agriculture, forest, and aquatic resources to make many commercial products including fuels, electricity, chemicals, adhesives, lubricants, composites, and building materials are a priority for the 21st century. In addition to enhanced energy security, development of biobased products and bioenergy represents an additional source of demand for agricultural products. Ethanol, biodiesel, and other biobased products are also necessary to provide products that have environmental benefits.

R&D efforts will target overcoming technical barriers to low cost biomass conversion with closer coordination and integration among Federal agencies and national laboratories, universities, private sector companies, and environmental organizations.

Outcomes

By expanding the development of biobased products and bioenergy, the increased demand for agricultural commodities will strengthen farm product prices and raise farm income, open new opportunities for business development and employment growth in rural America, enhance U.S. security by reducing dependence on imported oil and other materials, and improve environmental quality by reducing air pollution and greenhouse gas emissions.

ARS research in these areas supports Performance Goal 1.1.3.1: demonstrate postharvest technologies that add value and improve quality; and Performance Goal 1.2.2.1: experimentally demonstrate improvements in processing technologies and develop new bioproducts and uses that have potential to increase demand for agricultural commodities.

Specific Program Thrusts

- **Improve Conversion of Agricultural Materials and Wastes to Biofuels** ($8,000,000).
  Expanded use of biobased fuels will decrease dependence on imported petroleum, increase environmental quality, and improve rural economic stability. Efficiency of converting agricultural materials and wastes to biofuels, and coproducts, will be improved by developing processing technologies needed to create 21st century bio-refineries. Improvements in fundamental biochemical knowledge and technology breakthroughs will broaden the range of useful agricultural feedstocks from which bio-refineries can produce inexpensive biofuels and viable biobased products, including new polysaccharides, oils, and proteins. Specific outcomes include: stress-tolerant, thermophilic microorganisms that improve conversion of biomass to ethanol and biodiesel; efficient enzymes for conversion of cellulosic biomass to ethanol; economical enzymatic processes for breaking down cellulosic biomass to its component sugars; microorganisms that efficiently ferment the multiple sugars found in biomass; new procedures using environmentally benign bioprocesses and separation methods

to produce coproducts of biofuel production that have commercially valuable functional properties; and processes that improve the quality, including cold-flow and storage stability, of biodiesel.

- **Improve Biomass Feedstock for Energy Production** ($3,000,000)
  Renewable bioenergy and bioproduct crops can have significant environmental benefits, but these crops must provide clear economical benefits to the grower or they will not be grown. Thus, biomass plants must have the potential to be converted economically to liquid biofuels and bioproducts. Biomass crops grown for feedstock have qualities that affect their conversion efficiency and subsequent profitability as biofuel and bioproduct crops. Currently, ARS laboratories are conducting research on genetic improvements of crops grown for feedstock biomass. Funds will be used so these laboratories can also make genetic modifications in feedstock biomass crops to enhance their conversion and profitability as biofuel and bioproduct crops. Both conventional and molecular technologies will be used to develop such genetic improvements in warm-season and cool-season perennial grasses and perennial legumes. Improved methods for harvesting, handling, and storing herbaceous biomass crops will be identified, and the effect of management and storage of biomass crops on their chemical qualities will be determined. In other research, plant species and management practices will be developed to provide multiple benefits from resources protected in two major USDA conservation programs. Highly erodable lands can be protected by enrollment in the Conservation Reserve Program (CRP), and water quality can be protected with buffer strips. Research will be conducted to develop plant species and management practices that will provide sustainable and profitable biomass crops from CRP lands and buffer strips without diminishing environmental benefits.

- **Develop Technologies to Produce Biobased Products from Agricultural Commodities and Byproducts** ($4,000,000).
  Through fundamental breakthroughs in biocatalysis, fermentation, biotechnology, and separation processes, new biobased products will be developed having novel functional properties for applications previously unattainable or met only by petroleum-derived or other nonbiobased materials. Knowledge and technologies will be developed to produce biobased absorbents, adsorbents, coatings, biodegradable polymers, composite building materials, lubricants, surfactants, imported gum substitutes, and chemical building blocks for industrial and consumer applications. Specific outcomes include: surfactants and emulsifiers produced by fermentation of agricultural fats and oils; biodegradable lubricants produced from waste vegetable oils; new graft copolymer absorbents based on ungelatinized starch; biobased substitutes for imported gums, polymers, coatings, and adhesives; and industrial composites using cotton, epoxies, and coatings from agricultural materials and residues.

c) A decrease of $2,183,000 for projects to be funded in FY 2001 in Commodity Conversion and Delivery research to provide savings to finance higher priority research initiatives.

The budget recommends that all of the research projects which were added to the FY 2001 appropriations be discontinued in 2002. The Administration believes taxpayer dollars must be spent on the highest priority needs of national significance. The savings achieved will be redirected to finance such high priority agricultural research initiatives as recommended in the President's budget.

The projects recommended for elimination under this Objective are:

--Aflatoxin in Cotton (Cotton Resistant to Aflatoxin)
--Cotton Ginning Research
--Natural Products
--Postharvest and Controlled Atmosphere Chamber Research (Lettuce)

OBJECTIVE 5: HUMAN NUTRITION

1) An increase of $473,000 for research on Human Nutrition consisting of:

a) An increase of $673,000 for the anticipated FY 2002 pay raise.

These funds are critical to support an effective and responsive USDA in-house research capability. Absorption of the pay costs would result in further erosion of the Agency's capacity to maintain viable research programs. Absorption of these costs ultimately reduces the number of scientists and support personnel, and operating funds essential to carry out national research priorities.

As a percentage of total obligations, costs related to employee compensation will account for about 56 percent of total ARS spending in 2002, compared to about 53 percent estimated for 2001. If funds for increased pay costs are not provided, ARS would need to reduce spending in all non-pay areas by about 4.5 percent to make up the difference. Coupled with increasing inflationary costs not requested in the budget, a cut in appropriations for pay costs would cause an additional reduction in the ARS budget for equipment and supplies needed to carry out the national research program.

b) A decrease of $200,000 for projects to be funded in FY 2001 in Human Nutrition research to provide savings to finance higher priority research initiatives.

The budget recommends that all of the research projects which were added to the FY 2001 appropriations be discontinued in 2002. The Administration believes taxpayer dollars must be spent on the highest priority needs of national significance. The savings achieved will be redirected to finance such high priority agricultural research initiatives as recommended in the President's budget.

The project recommended for elimination under this Objective is:

--Barley Food Health Benefits Research

OBJECTIVE 6: INTEGRATION OF AGRICULTURAL SYSTEMS

1) An increase of $484,000 for research on Integration of Agricultural Systems consisting of:

a) An increase of $484,000 for the anticipated FY 2002 pay raise.

These funds are critical to support an effective and responsive USDA in-house research capability. Absorption of the pay costs would result in further erosion of the Agency's capacity to maintain viable research programs. Absorption of these costs ultimately reduces the number of scientists and support personnel, and operating funds essential to carry out national research priorities.

As a percentage of total obligations, costs related to employee compensation will account for about 56 percent of total ARS spending in 2002, compared to about 53 percent estimated for 2001. If funds for increased pay costs are not provided, ARS would need to reduce spending in all non-pay areas by about 4.5 percent to make up the difference. Coupled with increasing inflationary costs not requested in the budget, a cut in appropriations for pay costs would cause an additional reduction in the ARS budget for equipment and supplies needed to carry out the national research program.

OBJECTIVE 7: INFORMATION AND LIBRARY SERVICES

1) An increase of $369,000 for Information and Library Services consisting of:

a) An increase of $369,000 for the anticipated FY 2002 pay raise.

These funds are critical to support an effective and responsive USDA capability to provide information services in agriculture and related disciplines. Absorption of the pay costs would result in further erosion of the Agency's capacity to maintain viable programs. Absorption of these costs ultimately reduces the number of personnel available to provide timely, comprehensive information critical to the researchers and other users of these services and also reduces funds available to acquire materials needed to build the NAL collection.

AGRICULTURAL RESEARCH SERVICE
GEOGRAPHIC BREAKDOWN OF OBLIGATIONS AND STAFF YEARS
2000 Actual and Estimated 2001 and 2002

Location	2000 Amount	2000 Staff Years	2001 Amount	2001 Staff Years	2002 Amount	2002 Staff Years
ALABAMA, Auburn	$4,430,578	41	$5,544,900	48	$4,557,100	41
ALASKA						
Fairbanks	1,665,000	2	2,563,700	5	1,665,700	2
Palmer	677,748	2	950,200	3	680,800	2
Total	2,342,748	4	3,513,900	8	2,346,500	4
ARIZONA						
Phoenix	7,966,490	103	8,690,400	105	8,241,400	104
Tucson	3,575,025	45	3,285,900	45	3,285,900	45
Total	11,541,515	148	11,976,300	150	11,527,300	149
ARKANSAS						
Booneville	2,554,500	26	4,541,400	26	2,502,900	26
Fayetteville	1,735,301	12	1,514,500	12	1,514,500	12
Little Rock	7,014,522	4	7,911,100	8	7,911,100	8
Pine Bluff	803,879	5	937,900	5	870,600	5
Stuttgart	5,848,264	47	5,893,500	50	5,377,200	47
Total	17,956,466	94	20,798,400	101	18,176,300	98
CALIFORNIA						
Albany	26,166,525	235	27,856,500	249	29,927,100	270
Davis	7,675,203	52	7,969,100	55	8,205,400	57
Parlier	6,775,461	78	8,106,300	92	8,106,300	92
Riverside	4,612,509	44	4,771,200	46	4,771,200	46
Salinas	3,321,811	43	3,562,400	45	3,427,700	44
Shafter	950,948	14	1,052,900	14	1,052,900	14
Total	49,502,457	466	53,318,400	501	55,490,600	523
COLORADO						
Akron	1,223,103	20	1,239,400	20	1,239,400	20
Fort Collins	12,785,655	149	12,531,500	155	12,531,500	155
Total	14,008,758	169	13,770,900	175	13,770,900	175
DELAWARE						
Newark	1,355,427	17	1,344,700	17	1,344,700	17
DISTRICT OF COLUMBIA						
National Arboretum	7,515,331	100	8,621,100	101	8,621,100	101
Headquarters						
Federal						
Administration	42,735,518	499	45,689,600	499	45,689,600	499
Centrally Financed						
Services	11,655,737	--	8,285,700	--	8,285,700	--
Subtotal	54,391,255	499	53,975,300	499	53,975,300	499
Total	61,906,586	599	62,596,400	600	62,596,400	600

AGRICULTURAL RESEARCH SERVICE
GEOGRAPHIC BREAKDOWN OF OBLIGATIONS AND STAFF YEARS
2000 Actual and Estimated 2001 and 2002

Location	2000		2001		2002	
	Amount	Staff Years	Amount	Staff Years	Amount	Staff Years
FLORIDA						
Brooksville	1,193,779	11	1,261,700	11	1,261,700	11
Canal Point	1,481,401	25	1,501,500	25	1,501,500	25
Fort Lauderdale	1,300,459	15	1,314,700	15	1,584,700	16
Fort Pierce	7,306,582	63	7,633,800	66	7,746,900	66
Gainesville	11,749,332	140	12,498,700	143	11,510,900	140
Miami	2,924,121	38	3,057,700	39	2,950,000	38
Winter Haven	1,325,144	17	1,727,400	20	1,727,400	20
Total	27,280,818	309	28,995,500	319	28,283,100	316
GEORGIA						
Athens	22,108,091	221	24,189,800	245	23,835,000	240
Byron	2,658,520	33	2,759,800	33	2,759,800	33
Dawson	3,246,556	34	3,396,800	34	3,396,800	34
Griffin	1,475,797	17	1,788,600	19	1,788,600	19
Tifton	7,751,618	93	8,158,400	97	7,889,600	94
Total	37,240,581	398	40,293,400	428	39,669,800	420
HAWAII, Hilo	9,815,253	70	9,690,300	73	9,241,300	70
IDAHO						
Aberdeen	2,712,354	23	3,321,800	26	3,321,800	26
Boise	1,779,455	23	1,805,200	23	1,805,200	23
Dubois	2,015,241	13	2,059,000	13	2,059,000	13
Kimberly	2,709,743	32	2,580,700	32	2,580,700	32
Total	9,216,794	91	9,766,700	94	9,766,700	94
ILLINOIS						
Peoria	27,399,569	252	29,101,000	262	34,771,000	306
Urbana	3,620,788	34	3,710,900	34	4,160,900	37
Total	31,020,358	286	32,811,900	296	38,931,900	343
INDIANA, W. Lafayette	5,438,817	45	5,921,100	52	6,461,100	55
IOWA, Ames	31,251,535	344	33,599,800	358	32,567,100	352
KANSAS, Manhattan	8,324,546	85	8,046,900	92	7,597,800	85
LOUISIANA						
Baton Rouge	2,565,408	30	2,238,000	30	2,238,000	30
New Orleans	24,694,372	248	25,084,500	255	26,209,500	267
Total	27,259,780	278	27,322,500	285	28,447,500	297
MAINE, Orono	527,183	4	1,548,100	7	1,278,700	4

AGRICULTURAL RESEARCH SERVICE
GEOGRAPHIC BREAKDOWN OF OBLIGATIONS AND STAFF YEARS
2000 Actual and Estimated 2001 and 2002

Location	2000 Amount	2000 Staff Years	2001 Amount	2001 Staff Years	2002 Amount	2002 Staff Years
MARYLAND						
Beltsville	121,413,849	1,252	123,732,200	1,280	124,567,100	1,287
Frederick	2,756,937	33	3,002,400	36	3,272,400	37
Total	124,170,786	1,285	126,734,600	1,316	127,839,500	1,324
MASSACHUSETTS, Boston	14,933,172	11	14,857,900	11	14,857,900	11
MICHIGAN, East Lansing	4,035,545	52	3,983,900	52	3,983,900	52
MINNESOTA						
Morris	2,684,375	32	2,659,400	32	2,659,400	32
St. Paul	5,370,287	49	5,247,700	49	5,607,700	51
Total	8,054,662	81	7,907,100	81	8,267,100	83
MISSISSIPPI						
Mississippi State	8,673,592	95	8,445,600	102	7,457,800	95
Oxford	9,085,014	77	10,564,400	78	9,307,100	77
Poplarville	1,739,463	19	2,498,300	26	1,824,700	19
Stoneville	20,764,262	222	25,203,900	242	23,458,400	225
Total	40,262,331	413	46,712,200	448	42,048,000	416
MISSOURI, Columbia	7,285,505	63	7,950,600	70	7,341,200	63
MONTANA						
Miles City	2,312,774	22	2,163,500	22	2,163,500	22
Sidney	3,806,202	43	2,901,000	43	2,901,000	43
Total	6,118,975	65	5,064,500	65	5,064,500	65
NEBRASKA						
Clay Center	15,308,845	135	16,513,400	142	17,413,400	149
Lincoln	4,845,788	59	4,785,700	59	5,415,700	64
Total	20,154,633	194	21,299,100	201	22,829,100	213
NEW MEXICO						
Las Cruces	2,441,173	27	4,821,500	47	2,396,900	27
NEW YORK						
Greenport	11,508,545	58	12,397,400	66	11,589,200	66
Ithaca	9,062,826	52	8,670,800	61	10,770,300	75
Total	20,571,371	110	21,068,200	127	22,359,500	141

AGRICULTURAL RESEARCH SERVICE
GEOGRAPHIC BREAKDOWN OF OBLIGATIONS AND STAFF YEARS
2000 Actual and Estimated 2001 and 2002

Location	2000 Amount	2000 Staff Years	2001 Amount	2001 Staff Years	2002 Amount	2002 Staff Years
NORTH CAROLINA						
Raleigh	6,753,931	59	6,490,100	59	6,850,100	60
NORTH DAKOTA						
Fargo	10,694,518	118	11,673,600	128	11,000,700	119
Grand Forks	8,120,189	62	8,370,700	63	8,370,700	63
Mandan	2,886,735	41	2,871,800	41	3,141,800	42
Total	21,701,442	221	22,916,100	232	22,513,200	224
OHIO						
Columbus	781,937	8	742,000	8	742,000	8
Coshocton	1,005,972	15	973,100	15	973,100	15
Wooster	2,726,650	33	2,651,400	33	2,651,400	33
Total	4,514,559	56	4,366,500	56	4,366,500	56
OKLAHOMA						
El Reno	4,910,224	53	4,706,000	53	4,976,000	54
Lane	1,742,640	25	1,727,100	25	1,727,100	25
Stillwater	2,777,780	32	2,726,300	32	2,726,300	32
Woodward	1,500,688	21	1,544,500	21	1,544,500	21
Total	10,931,332	131	10,703,900	131	10,973,900	132
OREGON						
Burns	1,152,019	7	1,371,000	9	1,146,400	7
Corvallis	7,516,992	92	7,500,700	94	7,710,100	95
Pendleton	1,561,131	22	1,624,800	23	1,445,200	22
Total	10,230,143	121	10,496,500	126	10,301,700	124
PENNSYLVANIA						
University Park	3,320,888	41	3,855,600	44	3,676,600	41
Wyndmoor	26,224,259	232	27,700,700	242	29,905,700	256
Total	29,545,147	273	31,556,300	286	33,582,300	297
SOUTH CAROLINA						
Charleston	2,655,858	35	2,752,300	36	3,202,300	39
Clemson	1,966,398	30	1,995,500	30	1,995,500	30
Florence	2,162,493	28	2,411,200	31	2,411,200	31
Total	6,784,749	93	7,159,000	97	7,609,000	100
SOUTH DAKOTA						
Brookings	3,024,874	27	1,767,300	27	1,767,300	27

AGRICULTURAL RESEARCH SERVICE
GEOGRAPHIC BREAKDOWN OF OBLIGATIONS AND STAFF YEARS
2000 Actual and Estimated 2001 and 2002

Location	2000		2001		2002	
	Amount	Staff Years	Amount	Staff Years	Amount	Staff Years
TEXAS						
Beaumont	1,406,300	15	1,347,300	15	1,347,300	15
Bushland	2,674,456	35	2,657,500	35	2,657,500	35
College Station	13,569,840	144	14,462,300	153	14,716,100	158
Houston	11,829,960	9	12,281,200	9	12,281,200	9
Kerrville	2,540,180	38	2,684,700	38	2,684,700	38
Lubbock	5,249,616	70	6,306,400	80	5,632,900	73
Temple	3,178,600	45	3,141,900	45	3,141,900	45
Weslaco	8,581,976	113	8,893,200	118	8,938,700	118
Total	49,030,930	469	51,774,500	493	51,400,300	491
UTAH, Logan	5,172,651	49	5,575,400	56	5,350,900	49
WASHINGTON						
Prosser	2,780,922	30	2,942,600	33	2,718,000	30
Pullman	10,261,596	111	10,483,700	116	9,922,500	111
Wenatchee	1,394,562	23	1,544,900	23	1,544,900	23
Yakima	3,742,821	75	3,251,600	77	3,488,000	78
Total	18,179,901	239	18,222,800	249	17,673,400	242
WEST VIRGINIA						
Beaver	5,211,776	54	6,304,000	54	5,271,200	54
Kearneysville	5,212,705	61	6,046,900	68	6,046,900	68
Leetown	2,827,011	4	4,533,300	14	2,995,500	4
Total	13,251,492	119	16,884,200	136	14,313,600	126
WISCONSIN, Madison	7,338,156	63	7,295,300	70	7,701,400	73
WYOMING						
Cheyenne	1,623,171	22	1,805,000	22	2,075,000	23
Laramie	2,355,667	26	2,453,400	26	2,453,400	26
Total	3,978,838	48	4,258,400	48	4,528,400	49
PUERTO RICO						
Mayaguez	2,462,911	34	2,453,500	34	2,453,500	34
OTHER COUNTRIES						
Argentina, Buenos Aires	633,306	--	560,600	--	560,600	--

AGRICULTURAL RESEARCH SERVICE
GEOGRAPHIC BREAKDOWN OF OBLIGATIONS AND STAFF YEARS
2000 Actual and Estimated 2001 and 2002

Location	2000 Amount	2000 Staff Years	2001 Amount	2001 Staff Years	2002 Amount	2002 Staff Years
OTHER COUNTRIES (CONTINUED)						
France, Montpellier	2,202,664	4	2,218,400	7	2,488,400	7
Panama,						
Panama City	865,110	5	902,700	5	902,700	5
Total	3,701,079	9	3,681,700	12	3,951,700	12
Extramural and Funds Administered from Headquarters-Held Funds	19,077,286	--	41,751,800	--	44,233,400	--
Repair & Maintenance of Facilities	18,230,114	--	18,222,000	--	18,222,000	--
Unobligated Balance	3,155,113	--	--	--	--	--
Subtotal, Available or Estimate	835,513,000	7,760	896,835,000	8,136	896,835,000	8,136
Transfer from Office of Congressional Relations	(129,000)	--	--	--	--	--
Transfer from Agency for Int'l. Development (AID)	(5,000,000)	--	--	--	--	--
Rescission	3,938,000	--	1,977,000	--	--	--
Pay Costs	--	--	--	--	18,756,000	--
TOTAL, Appropriation	834,322,000	7,760	898,812,000	8,136	915,591,000	8,136

AGRICULTURAL RESEARCH SERVICE
STATUS OF PROGRAM

ARS finances and conducts research under seven major program activities: Soil, Water, and Air Sciences; Plant Sciences; Animal Sciences; Commodity Conversion and Delivery; Human Nutrition; Integration of Agricultural Systems; and Agricultural Information and Library Services. The research carried out under these program activities is explained in the "Purpose Statement" section of the Explanatory Notes. The selected examples of recent progress are listed by REE (Research, Education, and Economics) and ARS strategic planning goals.

Current program activities and progress under each research area are outlined below:

REE Goal 1 - Through research and education, empower the agricultural system with knowledge that will improve competitiveness in domestic production, processing, and marketing.

Current Activities

ARS conducts research designed to enhance production systems; improve the processing quality, performance, and value of commodities; and reduce pathogen risks that constitute nontariff agricultural trade barriers. With ARS research, the national needs for scientific agricultural information are met in a timely manner so that U.S. agricultural producers and processors have access to current knowledge and technologies. Because trade issues are global, ARS collaborates with foreign research institutions. ARS research results in technologies and practices that reduce pathogen risks, encourage increased trade in agricultural products, and mitigate nontariff barriers.

ARS research accomplishments strengthen the competitiveness of U.S. agricultural commodities in domestic and export markets by improving their quality, value, and marketability. The accomplishments include: lower cost ethanol, improved catfish growth rates, technology which reduces pesticide use and improves fruit quality, a possible method to eliminate mastitis in dairy cattle, live oocyst vaccination that reduces coccidiosis costs to the poultry industry, a method to accurately predict carcass yield, and new technology which increases pistachio production.

Selected Examples of Recent Progress

More rapid production of environmentally friendly ethanol at less cost. Separation of the corn kernel and hull in the current corn milling process requires large quantities of sulfites which can produce serious environmental and health risks. ARS scientists at the Eastern Regional Research Center in Wyndmoor, Pennsylvania and collaborators from the University of Illinois have successfully demonstrated a new corn soaking process using enzymes to reduce or eliminate the need for sulfites. In addition to environmental and health benefits, preliminary cost estimates indicate the new process cuts steeping time in half and reduces the cost of producing fuel ethanol by several cents per gallon. (Commodity Conversion and Delivery)

Process to convert ethanol byproducts to coatings and films. The volume of byproducts from ethanol production exceeds the demand for use as animal feed which is a barrier to reducing the cost of fuel ethanol. These byproducts contain zein, a major corn protein that has market potential. ARS engineers at the Eastern Regional Research Center have shown by use of laboratory and computer modeling techniques that a production scale continuous process for extracting zein from ethanol byproducts is realistic and economical. This process will result in expanded use of zein for industrial coatings and films and effectively lower the cost of producing fuel ethanol. (Commodity Conversion and Delivery)

Noninvasive sorting of pistachio nuts with closed shells can potentially save the industry $11 million per year. Scientists at Albany, California are cooperating with a major pistachio processor to manufacture and install an acoustic-based sorting system developed by ARS to separate pistachio nuts having closed shells. The sorters

have the potential of being used by every U. S. pistachio processor which would increase open shell pistachio production by 5 to10 percent. (Plant Sciences)

Particle film technology reduces disease and insect damage while improving fruit quality. The national tree fruit industry is facing losses of key insecticides in the year 2000 due to the Food Quality Protection Act and the continual development of resistance of pest organisms to pesticides. Concerns for human health and the environment have lead to reduced use of pesticides through the development of alternative pest management practices in integrated orchard management systems without reductions in orchard productivity. Scientists at Kearneysville, West Virginia are developing a particle film in cooperation with a private company for controlling a broad range of insect pests, while improving fruit quality. This material has been shown to repel insecticide resistant pear psylla in pear orchards, reduce fruit sunburn by 50 percent, and increase apple size and color. A patent was filed on the use of the material to reduce freezing of plants. This technology will reduce pesticide usage and improve fruit quality which is the key to maintaining the global competitiveness of U.S. fruit growers. (Plant Sciences)

Genetically improved line of channel catfish. Catfish with growth rates requiring more than one season to achieve market size cost more to produce. ARS scientists at the Catfish Genetics Research Unit in Stoneville, Mississippi have developed a genetically improved catfish line, USDA103, having improved growth rates. From the 1998 and 1999 spawning seasons, over 1.7 million USDA103 line catfish fry have been supplied to Mississippi State University for stocking earthen ponds at the Thad Cochran National Warmwater Aquaculture Center. Fish are currently being reared in three growing seasons to a size and age recognized by the industry as sexually mature broodfish and then released to commercial producers. (Animal Sciences)

DNA sequences of beef and dairy cattle and pig genes will be used to improve livestock production. Genetics plays a large role in animal production performance, efficiency, and profitability. Improvements in genetic selection for reproduction, nutrition, growth, animal health, and carcass traits will enhance profitability and global competitiveness. Identification of the many genes that influence each production trait will improve the accuracy of genetic selection and improve the understanding of the biological processes that control production. ARS scientists have sequenced 50,000 short segments of genes from beef cattle and 30,000 segments from pigs. They have also sequenced 12,000 short segments of genes from the mammary glands of dairy cattle. The gene sequences are accessible to the public through the databases of the National Center for Bioinformatics (NCBI) GenBank in Washington, D.C., and databases at the Clay Center, Nebraska facility. These research efforts are a major contribution to understanding the function of genes that influence livestock production. (Animal Sciences)

Chromosome 2 in cattle contains a gene(s) that influences birth weight. Large birth weight is a major cause of calving difficulty and consequent calf mortality, but selection only for lower birth weights reduces subsequent growth rate. ARS scientists conducted a genomic study and found that a region of chromosome 2 contains a gene or genes that affects birth weight without reducing subsequent growth. This discovery is important because it will increase the number of live calves produced and the overall profitability of cattle production. Producers will be able to use DNA markers to select cattle with lower birth weights and thus less calving difficulties, yet still be able to maintain high growth rates. (Animal Sciences)

Computerized image analysis developed for predicting carcass yield. Profitability in the meat industry is limited by inability to consistently produce lean, palatable products. An accurate method for predicting carcass yield is needed by the meat industry to be able to reward producers of high yielding carcasses, and ensure consumer satisfaction. A joint research effort between ARS scientists and IBP, Inc., has resulted in the development of a computerized image analysis system to accurately predict carcass yield determined from the 12th rib area of beef carcasses. Implementation of this technology will allow packers to more clearly communicate value differences of beef carcasses and provide greater incentives to produce leaner, higher yielding beef animals. (Animal Sciences)

Mastitis resistant model. Mastitis is the most prevalent and costly disease of dairy cows because of its negative effects on milk revenue, milk quality, and veterinary costs. Enhancing a cow's resistance to mastitis pathogens would be financially beneficial to the dairy industry. One third of the mastitis infections in dairy cattle is caused by *staphlococcus aureous* bacteria, which costs milk producers about $1 billion annually. To test a genetic engineering approach to eliminating mastitis in dairy cattle, a joint research effort between University of Vermont scientists and ARS scientists has developed a transgenic mouse carrying the gene for lysostaphin, a naturally occurring bacterial protein that kills *S. aureus*. The transgene was designed to only be expressed in the mammary gland. Milk from the transgenic mice kills *S. aureus*. When *S. aureus* is infused into mammary glands, the bacteria are killed which protects against mastitis. These research findings suggest that it is possible to produce cattle that are highly resistant to *S. aureus* mastitis and thereby increase the profitability of U.S. dairy production. (Animal Sciences)

Genomic sequencing determined the source of vesicular stomatitis virus. Vesicular stomatitis virus (VSV) caused great economic losses to the cattle and horse industries in the southwestern United States in 1995, 1997, and 1998. The source of the virus was unknown. Using genomic sequencing and analysis, ARS demonstrated that the outbreaks that resulted from VSV were similar to the viruses circulating in Mexico. This information has focused attention on the factors influencing the introduction of VSV into the U.S. from Mexico. (Animal Sciences)

A new malignant catarrhal fever virus discovered in white tailed deer. Malignant catarrhal fever (MCF) is a serious viral disease of cattle and some wild ruminants. In collaboration with two universities, ARS discovered a new herpes virus that causes MCF in white tailed deer of North America. ARS has developed new serologic and polymerase chain reaction-based tests that allow accurate rapid diagnosis of MCF. (Animal Sciences)

Determining sustainable livestock grazing levels on rangelands in the Southern Great Plains. Managers must know the long term carrying capacity of ranges in order to balance livestock production with conservation of soil, water, and plant resources. Scientists at Woodward, Oklahoma completed a 10 year study of the impact of different numbers of grazing livestock on sandy rangelands common to the region. They found that providing about 17 acres per cow-calf unit would ensure the long term sustainability of all resources. (Soil, Water, and Air Sciences)

Live oocyst vaccination reduces the cost of coccidiosis to the poultry industry. Avian coccidiosis is a parasitic disease of poultry that costs the industry over $450 million annually. Control methods traditionally rely on anti-parasitic drugs, but these compounds are becoming ineffective due to parasite resistance. A live oocyst vaccination system developed by ARS scientists was used in field trials involving 22.4 million birds. Vaccination against drug resistant strains of coccidia coupled with anti-coccidial medication resulted in enhanced performance in broiler flock growout. Use of this system by the U.S. poultry industry will reduce the economic and animal health impact of this parasitic disease. (Animal Sciences)

Fall and winter grazing of winter wheat lowers grain yields. Growing winter wheat as a duel purpose crop for both forage and grain is a common practice in the Southern Great Plains because it increases diversification and marketing flexibility. However, there has been uncertainty about the impact of grazing on wheat yields. Field studies by ARS and Oklahoma State scientists found that fall and winter grazing of 12 different varieties of hard red winter wheat reduced grain yields by 26 percent and sometimes reduced protein content of the grain. (Plant Sciences)

REE Goal 2 - To ensure an adequate food supply and improved detection, surveillance, prevention, and educational programs for the American public's health, safety, and well-being.

Current Activities

ARS conducts research to ensure a secure agricultural production system that reduces or eliminates factors that

threaten the ability of U.S. agriculture to produce sufficient food to meet the needs of consumers. ARS' research is designed to generate knowledge regarding new and improved management practices, pest management strategies, sustainable production systems, and control of potential contaminants. Food safety research seeks ways to assess and control potentially harmful food contaminants.

ARS' research accomplishments include: a method to detect cryptosporidium in water, a new wood product which is termite and wood-rot resistant, an areawide program to control Formosan subterranean termites, a new approach to control campylobacter in poultry, a method to rapidly detect viruses in aquaculture products, avidin (an egg white protein) which inhibits insect development in stored grain, an irradiation treatment which eliminates pathogens in hot dogs, solarization as a methyl bromide replacement, a method to detect *cryptosporidium* in water, and technology which produces lipid products that have beneficial cholesterol lowering effects.

Selected Examples of Recent Progress

An organic mulch made from a cover crop called hairy vetch thwarts hungry Colorado potato beetles in vegetable crops. The Colorado potato beetle costs U.S. potato, tomato, and eggplant growers about $150 million annually in product losses and insecticide-related costs. ARS scientists at Beltsville, Maryland have found that hairy vetch impedes beetle movement, thereby lessening damage. This pest is notorious for its ability to develop resistance to insecticides thus biocontrol is the key to protection. In the study, beetle establishment occurred at a lower rate on tomatoes transplanted into hairy vetch mulch than on those transplanted into black plastic mulch. Yields of staked, fresh market tomatoes grown in hairy vetch mulch was comparable to control plots treated with insecticides. Noninsecticidal methods of control could be useful components of an integrated pest management strategy if they reduce pesticide inputs and slow the rate at which resistance develops. (Plant Sciences)

Listening to the loud munching sounds of Asian longhorned beetles may give scientists a clue as to which trees are infested. First found in the trees in New York in 1996 and Chicago in 1998, Asian longhorned beetles (ALB) have been intercepted at ports in 17 States. If *Anoplophora glabripennis* spreads unchecked into U.S. urban and forest lands, the damage would cost billions of dollars. So far, the only solution to the problem has been to remove infested trees. ARS scientists at Newark, Delaware have discovered new information never before recorded about ALB behavior. ARS scientists and their colleagues at the State University of New York at Syracuse are working with a specialist on a feeding noise recognition system. The system generates an acoustic "fingerprint" as the beetle larvae feed within the two different tree tissues that they commonly inhabit, inner bark and inner wood. A functional prototype detection system should be available within a year. (Plant Sciences)

Solarization as a methyl bromide replacement. Methyl bromide, a widely used soil and postharvest commodity fumigant, is scheduled to be banned in the year 2005 because of damage to the stratospheric ozone layer. Unless practical economical alternatives are found, growers and other preharvest methyl bromide users will be negatively impacted. An ARS scientist at the U.S. Horticultural Research Laboratory in Fort Pierce, Florida covered soil under clear plastic for at least six weeks during summer to "cook" weed seeds, disease organisms, and some nematodes. Yields on three covered pepper fields were comparable to those receiving methyl bromide fumigation. In tests run on an organic farm, production rose 30 percent, labor declined 75 percent, and profits increased 100 percent. This technique which is effective for crops planted in the fall requires fields to be prepared at least six weeks before planting and favorable weather. (Plant Sciences)

Avidin, a common protein in human diets, inhibits insect development in stored grain. Scientists and colleagues working at the Grain Marketing and Production Research Center in Manhattan, Kansas were the first to report that avidin, an egg white protein, has a lethal effect on stored product beetles and moths. Using corn meal made from transgenic corn that produces avidin, they were able to demonstrate insect resistance and longer product shelf life. If the FDA approves avidin-producing corn for human food consumption, these findings offer the possibility of controlling insects that cost farmers millions of dollars in lost product during storage with a

nonchemical alternative to toxic pesticides. (Plant Sciences)

Nutraceutical lipids, fats, and oils that impart extraordinary health benefits to consumers is one of the fastest growing segments in the food ingredient market. Scientists at Wyndmoor, Pennsylvania have developed the technology to produce structured lipid products from commodity type fats and oils in collaboration with a CRADA (Cooperative Research and Development Agreement) partner. These lipid products, which are formed by a combination of physical and enzymatic steps, have been shown in studies by the CRADA partner to have beneficial cholesterol lowering effects when used as dietary supplements for individuals with high cholesterol levels. A patent application for this jointly owned technology was prepared and filed by the collaborator. (Plant Sciences)

Data contributed to support registration of minor uses of pesticides. ARS scientists located in nine States and the District of Columbia cooperate with State scientists through the IR-4 minor use program to obtain efficacy, phytotoxicity, and residue data which are essential to support minor use registrations. During FY 2000, ARS contributed data on 96 food, 249 ornamental, and 63 residue projects to the IR-4 program (which evaluates the efficacy and residues of minor use chemicals). The registrations resulting from these data will provide growers with the tools necessary to reduce pest losses and maintain crop yield and quality. (Plant Sciences)

Control of cocoa diseases. Cocoa is a significant source of income for small farmers in the Americas and West Africa. The major disease limitation, *Crinipellis perniciosa and Monilopthora roreri*, (witches broom and frosty pod), has resulted in crop losses of up to 80 percent in some regions, and has now become endemic to the tropical Americas. U.S. industry concerns revolve around the loss of production in Brazil and the possibility that either disease could reach West Africa, which would prove catastrophic to the confectionary and related industries in the United States. ARS has developed a consortium with the U. S. and European industries, British and French research organizations, and the governments of Costa Rica, Peru, and Brazil to search, bioassay, and field trial competitive agents, primarily endophytes, which will compete ecologically with the target diseases. Currently, ARS in cooperation with the U.S. industry and the Brazilian and Peruvian governments, have completed moderately successful field trials in both countries. Early results using the fungus *Tricoderma* suggest that the strategy is sucessful if coupled with appropriate field sanitation and farmer training. This year, the consortium hopes to improve efficacy by innoculating nursery plants in Peru and Brazil. (Plant Sciences)

Guayule composite board foils termites and fungi. Wood destroying organisms cause several billion dollars of damage annually in the U.S. ARS researchers at Phoenix, Arizona, together with cooperators at the University of Arizona and the University of Illinois, have developed composite boards made from guayule pulp and high density plastic. When exposed to termites or wood-rot fungi, the composite boards were not damaged. The development of a new termite and wood-rot resistant wood product demonstrates an important new potential use for guayule, a semiarid drought tolerant crop that also produces nonallergenic latex. Commercial production of guayule as an alternative crop would help conserve U. S. water and forest resources. (Commodity Conversion and Delivery)

A method was developed to detect *cryptosporidium* in water samples. Protozoan parasites including *Cryptosporidium*, *Cyclospora*, and *Microsporidia* continue as major food and waterborne pathogens worldwide that are responsible for severe diarrheal disease in tens of thousands of people in the U.S. alone. Scientists at the Immunology and Disease Resistance Laboratory in Beltsville, Maryland have developed a molecular technique to rapidly detect *Cryptosporidium* in water samples. This test, which showed strong correlation with infectivity of the parasite, will provide public health officials with a method to assess the safety of water relative to this parasite. Ultimately it will reduce the incidence of protozoal diarrhea in the human population. (Soil, Water, and Air Sciences)

Areawide management successfully used for control of Formosan subterranean termites. The Formosan subterranean termite causes extensive damage to wood structures and trees in many areas of the United States. The effectiveness of current control strategies is limited. An areawide termite management program conducted

jointly by ARS scientists at the Southern Regional Research Center, the Louisiana State University, and cooperators with the New Orleans Mosquito and Termite Control Board has resulted in a reduction in infestation of 30 percent measured during swarming and 50 percent measured by ground foraging activities. These results are encouraging for communities where termites are a significant problem. They suggest that an organized control program using methods of population suppression and colony elimination would have a major impact on reducing damage caused by these insect pests. (Animal Sciences)

Preharvest certification of pork protects consumers. Consumers want assurance that trichinella is no longer a human health risk associated with eating pork. ARS scientists, together with the pork industry, have developed a certification system based on knowledge of risk factors, detection methods, and good management practices. Certification requires that pork producers meet certain management criteria which eliminate risking exposure of pigs to the trichinella parasite. This certification program has been adopted by the pork industry; APHIS and FSIS are currently developing regulations for management of the program. Certification should help USDA establish equivalency agreements with foreign markets regarding the safety of U.S. pork. (Commodity Conversion and Delivery)

Rapid detection of viruses in aquaculture products. Rapid methods are needed for the detection of enteric viruses such as hepatitis A, Norwalk, and rotavirus in food and water. ARS has succeeded in developing a much safer and more rapid analytical method for the cell-culture-based enumeration of hepatitis A virus, and human and simian rotavirus using enhanced chemiluminescence (luminescence due to chemical reaction) technology. The new method reduces by five days the previous assay procedure and eliminates the use of radioactive isotopes in the detection protocol. The new method will have broad-based appeal for regulatory and action agency monitoring aquaculture products such as oysters, and will be particularly useful in determining the effectiveness of processing strategies for the inactivation of viruses. (Commodity Conversion and Delivery)

Irradiation treatment to inactivate pathogens on hot dogs. ARS evaluated the use of irradiation to eliminate the bacterial pathogen *Listeria monocytogenes* from hot dogs. Studies concluded that a 99.999 percent reduction of this pathogen was achieved with a radiation dose of 3.6kGy, thus meeting the regulatory goal of the FDA regarding radiation dosage. Since differences in radiation sensitivity were discovered that depended on product formulation, the irradiation processing step would require product dependent adjustments based on the amount of irradiation dosage required.. (Commodity Conversion and Delivery)

Levels of E. coli in beef. ARS determined the relationship between contamination of the live beef animal and the carcass. Results showed unexpectedly high numbers of animals per lot entered the slaughter plant carrying *E. coli* O157:H7/NM, however, very few of the carcasses were still contaminated after processing. These data have contributed to the food safety and policy debates regarding the commonness of this strain of *E. coli*, the usefulness of sampling procedures, and the strategies to eliminate *E. coli* 0157:H7/NM contamination of the beef supply. (Commodity Conversion and Delivery)

Aflatoxin found in natural desert habitats. To successfully prevent aflatoxin in food commodities, it is necessary to identify ecological niches harboring reservoirs of *A. flavus*. ARS scientists examined natural habitats of the Sonoran desert and found that key food and shelter sources for wildlife supported high populations of *A. flavus*. Legume fruits in particular were found frequently contaminated with aflatoxins. This is the first evidence that contamination is a frequent, natural phenomenon that may affect animals, even in habitats not directly involved in growing food crops. Thus, reservoirs of *A. flavus* not previously recognized, do exist in natural habitats and must be considered by aflatoxin management programs. (Animal Sciences)

Transmission of campylobacter through birds. Effective interventions for campylobacter in poultry are lacking because effective control measures have not been identified. ARS scientists isolated and genetically characterized campylobacter from commercial breeder flocks and their offspring broiler flocks. Use of sensitive genetic techniques demonstrated that campylobacter could be transmitted through bird generations via the fertile hatching egg. This new information will help in developing effective controls that will break the cycle of infection in broiler chicks and control a serious human health hazard. (Animal Sciences)

Diversity of gene sequences in corn breeding lines. Efficient use of naturally occurring genetic variation in corn is difficult because most agronomic traits involve multiple genes. ARS scientists at Raleigh, North Carolina have used large scale DNA sequencing of genes from diverse corn germplasm to associate specific genes with the particular traits they produce. Traits of interest are those controlling nutrient utilization, flowering time, and plant height. This information can be used to assess the diversity of U.S. corn breeding lines and accelerate breeding corn for a range of environments. (Plant Sciences)

More efficient storage of valuable genetic stocks for improving forage quality. Improving the resistance of forage grasses to diseases, weeds, droughts, and other stresses requires access to diverse genetic stocks for breeding programs. Ultra-cold conditions (cryopreservation) are commonly used to store genetic stocks at low cost for long periods, but many warm season grasses perish under such condition. Scientists at Corvallis, Oregon have developed new techniques for successfully storing grass meristems in cold conditions. These techniques will lower the cost of maintaining a diverse mix of genetic stocks of warm season grasses by reducing reliance on vegetative preservation using clonal repositories, greenhouses, and field plots. (Plant Sciences)

REE Goal 3 - A healthy and well nourished population who have knowledge, desire, and means to make health promoting choices.

Current Activities

ARS conducts human nutrition research that establishes the relationship between diet and health, measures food consumption patterns, and develops new methods to measure the nutrient composition of food. The outcomes of these efforts are a safe and nutritious food supply, and a knowledge base that enables humans to make healthful food choices.

ARS' research has found: zinc levels are predictive of mood disturbances and behavior problems in school aged children, flavonoids inhibit glucose uptake, early nutritional deficits impair learning ability, gender affects heart disease, calcium absorption and bone calcium deposition are most significant during early puberty, and conjugated linoleic acid does not have beneficial effects as previously thought.

Selected Examples of Recent Progress

Peak rates of bone calcium deposition early in adolescence. Investigators at the Children's Human Nutrition Research Center at Baylor College of Medicine found that increased calcium absorption and bone calcium deposition are most dramatic during early puberty and that the changes were associated with maturation of the hypothalamic-pituitary axis and physical changes of breast development. These early changes lead to peak rates of bone calcium deposition prior to menarche in girls. The studies have led to recent revisions of the dietary guidelines for children which now recommend increased calcium intake beginning at age 9. (Human Nutrition)

Factors contributing to weight regain in cyclic dieters. Investigators at the Western Human Nutrition Research Center found that the resting metabolism of women who are cyclic dieters was very similar to that of women who were not cyclical dieters under both normal and restrictive dietary intake conditions. However, after eating a mixed meal, cyclical dieters favored the use of carbohydrates for energy and had a decreased capability to use fat. This finding may be indicative of a metabolism that favors storage of fat and contributes to the ease of weight regain in cyclic dieters. (Human Nutrition)

Role of genetics in determining plasma apolipoprotein levels. The effects of genetic factors on plasma apolipoprotein levels in the Framingham Offspring Study and other populations was assessed by scientists at the Human Nutrition Research Center on Aging at Tufts University. They found that the apoE genotype has a very significant effect on modulating plasma apoE levels. This may be of relevance not only to coronary heart

disease risk, but also to the risk of Alzheimer's disease, since carriers of the apoE-4 allele have markedly decreased apoE levels which increases the risk for Alzheimer's disease and dementia. (Human Nutrition)

Gender differences with regard to heart disease risk. Women have lower age adjusted risk of heart disease than men which partly relates to their 20 to 25 percent higher HDL cholesterol and apoA-1 levels. To gain an understanding of this difference, researchers at the Human Nutrition Research Center on Aging at Tufts University examined the regulation and apoA-1 secretion and production in human liver cells treated with or without estrogen. They found that estrogen markedly increased apoA-1 gene expression by affecting the promoter of the apoA-1 gene which results in increased apoA-1 levels. This data helps to gain insight into understanding the indications for the use of hormonal replacement in postmenopausal women for heart disease risk reduction. (Human Nutrition)

Nutritional Assessment Survey (NAS) conducted in Lower Mississippi Delta. Investigators with the Lower Mississippi Delta Nutrition Intervention Research Initiative conducted the survey to describe the nutrition and health status of the population of the Lower Mississippi Delta in Arkansas, Louisiana, and Mississippi. The information obtained will provide baseline data to design, implement, and evaluate culturally appropriate, sustainable nutrition intervention research in a rural region of the U.S. The goal is to reduce nutrition related chronic disease rates in the three States ranked last in a recent report on health status in the U.S. The data is currently being analyzed. (Human Nutrition)

Body size and behavioral traits play role in dietary intake reporting. Dietary assessment methods have a strong bias toward underestimation of habitual energy intake. A study of normal weight and obese women conducted at the Western Human Nutrition Research Center revealed that body size and behavioral traits played a role in the ability of women to accurately self report energy intake. Body mass index was predictive of under-reporting of energy intake by normal weight women, while emotional factors related to depression were a determinant of underreporting in obese women. This research is important for understanding the factors which can influence the validity of dietary methods when applied to overweight and normal weight populations. (Human Nutrition)

New method for determination of niacin. Investigators at the Beltsville Human Nutrition Research Center have developed a new method for determination of niacin (a vitamin essential for growth) in infant formula using solid phase extraction ion exchange chromatography. It has been recognized as an Association of Official Analytical Chemists (AOAC) peer-validation method which permits its use as an alternative to the current labor intensive official AOAC microbiological method currently required to be used by private sector and regulatory food testing analysts to generate data in response to food labeling regulations. (Human Nutrition)

Zinc status is predictive of mood disturbances and behavior problems. Hair zinc concentration was found to be negatively associated with teacher reported anxiety and depression, withdrawal, and adjustment problems in a study conducted by investigators at the Grand Forks Human Nutrition Research Center in collaboration with investigators from Texas. The findings provide the first evidence that zinc status is predictive of mood disturbances and behavior problems in school aged children. They also point to the need for further study to determine whether increased zinc intakes might prevent or help alleviate mood and behavior problems that directly affect school performance, cognitive and social development, and quality of life for many children. (Human Nutrition)

Early nutritional deficits affect learning ability. Investigators at the Arkansas Children's Nutrition Center found that elementary children and junior high school children who were undernourished at a young age had slower reaction times which points to differences in neurophysiology of specific brain areas. Frontal sites are often linked to post-decisional information processing. These results are important because they suggest that early nutritional deficits can produce problems related to information processing which can impair learning ability. (Human Nutrition)

Flavonoids as inhibitors of glucose uptake. Investigators at the Beltsville Human Nutrition Research Center identified flavonoids (substances that act as catalysts in biological reactions) as inhibitors that limit the uptake of glucose. A portion of the flavonoid structure was also characterized that is regarded as the binding site where the restriction of glucose occurs. More than ten flavonoids were investigated in U937, HL-60, and Jurkat cells to identify potent blockers of the movement of glucose. Data indicated that flavonoids are potent inhibitors of glucose uptake and may have potential for reducing the surge of glucose plasma of hyperglycemic patients. (Human Nutrition).

Conjugated linoleic acid (CLA) not shown to have a beneficial effect. Animal studies have found beneficial effects of CLA feeding, such as enhanced immune response, improved cardiovascular health, and other health indices. Researchers at the Western Human Nutrition Research Center conducted a study to determine if similar effects could occur in humans. Analysis of samples and data from the study showed that CLA supplementation had no beneficial or adverse effects on immune status, cardiovascular health, and body composition. Further studies are needed to determine whether the discrepancy between human and animal studies is species different or due to other factors. (Human Nutrition)

Brown versus well milled rice assessed for zinc bioavailability. Investigators at the Grand Forks Human Nutrition Research Center assessed the nutritional impact of brown versus well milled rice by evaluating the effects of milling on the nutritional bioavailability of zinc from Philippine rice on laboratory rats. The findings support the use of brown rice which would contribute more zinc although somewhat less in bioavailable form than refined rice. (Human Nutrition)

REE Goal 4 - To enhance the quality of the environment through better understanding of and building on agriculture's and forestry's complex links with soil, water, air, and biotic resources.

Current Activities

ARS seeks to enhance the quality of the environment through a greater understanding of agriculture's complex links with soil, water, air, and biotic resources. The scientific program in natural resources and sustainable agricultural systems involves multidisciplinary research to solve problems arising from the interaction between agriculture and the environment. New practices and technologies are developed to conserve the Nation's natural resource base and balance production efficiency and environmental quality. ARS collaborates with foreign researchers to address global environmental problems.

ARS' research accomplishments include: corn and barley with greater nutritional value, a method which separates solids and liquids from swine wastewater, chemicals that destroy harmful bacteria and reduce manure odors, switchgrass buffers which reduce leaching of pesticides into groundwater, polyacrylamide and riparian buffers which limit water pollution, a deer treatment device that reduces ticks which transmit lyme disease, a wetland/reservoir subirrigation system which minimizes sediment and nutrient loading of streams and rivers, and a blowing dust warning system that alerts individuals with health problems.

Selected Examples of Recent Progress

Low phytic acid corn has potential nutritional value in foods and feeds. ARS scientists at Aberdeen, Idaho have developed corn and barley varieties with low phytic acid. Cooperators at the University of Colorado Health Center found that human subjects retained 70 percent more zinc from foods prepared with low phytic acid corn compared to normal corn. Cooperators at Montana State University found that heifers gained up to 33 percent more weight per day when consuming low phytic acid barley compared with normal barleys. These results indicate that low phytic acid grains may have enhanced nutritional value for both humans and livestock. (Plant Sciences)

Pathogens found in karst groundwater. Recent research conducted in the karst landscapes of West Virginia is providing a greater understanding of how livestock production can lead to serious groundwater contamination. The presence of cryptosporidium parvum and other pathogens in the karst groundwater of the region was shown to be a problem. Since *cryptosporidiosis* poses a serious health risk, this discovery is significant because of the importance that karst groundwater has as a primary source of drinking water for rural families and communities. Best management practices such as sink hole filter caps, fencing, and guidelines for relocation of animal feeding operations that can be used to reduce nutrient losses to groundwater are being evaluated in terms of reducing the risk of pathogen contamination. (Soil, Water, and Air Sciences)

Cost effective alternatives for reducing sediment loads in unstable stream channels. Stream corridors in agricultural landscapes suffer from erosion, sedimentation, and extreme ecological degradation. A low cost, environmentally friendly stream corridor rehabilitation project involving a mix of structures comprised of large wood debris and planted vegetation was used to develop wildlife habitat and to control bank erosion at one-third the cost of traditional channel stabilization. Strategies developed by this project will result in reduced offsite sediment losses and improved water quality. The project was constructed in Chickasaw County, Mississippi by the Natural Resource Conservation Service under the direction of ARS scientists at Oxford, Mississippi. (Soil, Water, and Air Sciences)

Switchgrass buffers reduce the leaching of pesticides to groundwater. Previous studies have shown that grass buffers will reduce a large portion of the runoff water carrying herbicides such as atrazine, but they have provided no information on the leaching or degradation of atrazine after it entered the buffer. Since riparian buffers are located near streams, investigations on the fate of atrazine, one of the more common herbicides, in grass hedges and riparian buffers were conducted at two sites in Iowa. A comparison of three buffers planted to different grass species showed species-related effects on atrazine losses to groundwaters. Switchgrass buffers tended to decrease the leaching of the herbicide relative to cropped soil, whereas big bluestem and eastern gama grass permitted greater leaching than the switchgrass stands. Leaching in switchgrass buffer soils was slightly less than in soils cropped to corn and soybeans, although switchgrass buffers showed evidence of rapid atrazine transport through macropores (i.e., root holes, worm burrows) in the soil. These findings indicate that different grass species can have a positive influence on the removal of pesticides in riparian buffers. Some leaching of atrazine will occur in grass buffers but the buffer soils retain the chemical to a greater extent than row cropped soils. (Soil, Water, and Air Sciences)

Polyacrylamide (PAM) and riparian buffers reduce water pollution by microorganisms. Total bacteria and fecal coliform bacteria were measured in water flowing over soil that had been treated with cattle, fish, or swine manure combined with PAM, PAM+alum (aluminum sulfate), or PAM+caustic lime (calcium oxide) mixtures in furrows. Alum is used in poultry houses to reduce ammonia losses and phosphorus solubility in the manure. These compounds reduced the numbers of bacteria in wastewater by 99 percent. PAM+alum or PAM+lime spread on the soil around animal confinement areas were shown to decrease the number of microorganisms in runoff water, thereby reducing bacterial pollution of surface waters and groundwater. The benefits of using riparian vegetation to remove bacterial contaminants were also determined. Total bacteria and fecal coliform bacteria were monitored in soil and shallow groundwater within a riparian buffer at various distances from a swine wastewater application site. The survival of total and fecal coliform bacteria in both soil and groundwater decreased at higher soil temperatures and lower soil moisture contents. The findings suggest that animal production operations located in warm-dry climates have a lower potential for contaminating surface water and groundwater with bacteria from animal waste applications than those in cold-wet climates. (Soil, Water, and Air Sciences)

A wetland/reservoir subirrigation system reduces sediment and nutrient loading of streams and rivers. Researchers at Columbus, Ohio have demonstrated that a new water management technology described as a wetland/reservoir subirrigation system (WRSIS) can reduce offsite losses of runoff water, including sediments and nutrients to lakes and streams by as much as 80 percent. The WRSIS technology collects runoff and drainage water from subsurface drainage pipes into a constructed wetland where it is treated and then stored in a reservoir to be used in dry periods to subirrigate crops by returning the water into the drainage pipes.

cost benefit analysis based on current economic values was used to compare operation and investment costs with the benefits including improved crop production, improved water quality, increased residual land value, decreased tax liability, and wetland mitigation payments for this new water management technology. Results indicated that many farmers would be unable to adopt this system unless a mitigation payment or subsidy were received for the environmental benefits that are derived. (Integration of Agricultural Systems)

Dealing with agricultural dust problems. Fine dust particles from wind erosion of agricultural fields are known to pose health hazards for the very young, the elderly and those with respiratory problems. Very severe dust storms also limit highway visibility and create hazards. On September 25, 1999, high winds swept agricultural surface soils into a dust cloud of such density and extent that a major multiple vehicle accident occurred on Interstate Highway 84 in northeastern Oregon. The accident claimed seven lives and injured 40 others. Using research-based information, ARS scientists at Pullman, Washington teamed with personnel of the Natural Resources Conservation Service and the National Weather Service to develop a Blowing Dust Warning Index. It is designed for use by highway, police, and health agencies so that travelers and persons susceptible to health problems from dust can be warned to take protective actions. In related work, Pullman scientists also developed potential dust hazard maps for the wheat producing region of eastern Washington. These maps will be used by agencies and conservation districts to prioritize expenditures of funds for reducing dust emissions in the high hazard zones. (Soil, Water, and Air Sciences)

A method for high rate separation of solids and liquids from swine wastewater has been developed. Effective solids-liquid separation is an important component of a wastewater treatment system. ARS scientists from Florence, South Carolina in cooperation with scientists from North Carolina State University have installed and evaluated a solids-liquid separation method based on sand filtration with polyacrylamide injection to flocculate wastewater solids. The pilot system which handled 6000 gallons of flushed swine wastewater weekly which produced removable solid cake within 48 hours. In the liquid phase, suspended solids were reduced from 6000 to 100 parts per million. This solids-liquid separation process could be used as part of a system of treatment technologies that could eventually replace anaerobic lagoons. (Soil, Water, and Air Sciences)

Chemical additives kill harmful bacteria and reduce odor problems in manure. Odor problems and disease causing bacteria are associated with stored manure. ARS scientists have identified two environmentally safe chemicals, carvacrol and thymol, that stop all fermentation activity and odor emissions when added to cattle or swine manure by killing pathogenic bacteria. These chemicals are generally recognized as safe for use as antimicrobial agents to control pathogens and odor in manure. (Animal Sciences)

A geographic information system (GIS) was developed to monitor the distribution of household pests. Urban insect pests have become an increasing problem in and around human dwellings, restaurants, and food storage areas where they transmit diseases and cause allergy problems. There is an increasing public demand for safe, effective, and environmentally sound methods to control pests. Scientists at the Center for Medical, Agricultural, and Veterinary Entomology in Gainesville, Florida have developed a spatially-based GIS system for monitoring and precision targeting pest distributions which can be used to minimize the use of pesticides by delivering chemicals only to infected areas. The system can also document the effectiveness of treatment in reducing insect pest populations. The system will be of value to the entire pest control community and will benefit the general population by providing improved control of numerous species of insect pests. This accomplishment received the Pollution Prevention Project of the Year Award by the EPA/DOD/DOE joint Strategic Environmental Research and Development Program. (Animal Sciences)

Use of deer treatment devices have been shown to reduce populations of ticks that transmit lyme disease. Lyme disease and other tick borne diseases pose a major threat to human health throughout the U.S. The incidence of Lyme disease is increasing in both the number of cases and their geographic distribution, largely as a result of expanding populations of deer which serve as the primary host for the adult ticks that transmit the disease. ARS scientists in the Parasite Biology and Epidemiology Laboratory in Beltsville, Maryland and the Knipling-Bushland Livestock Insects Research Laboratory in Kerrville, Texas led a five State areawide management study to test the efficacy of a topical application device (deer treatment station) for reducing populations of

lyme disease causing ticks. Deer were treated with an environmentally safe acaricide while feeding. Results through the fourth year of this project have shown significant reductions in the numbers of both adult and nymphal ticks in treatment areas. At the conclusion of this project in the year 2002, the topical application treatment technology will be transferred to public health officials and others interested in the use of areawide control programs to reduce the incidence of disease carrying ticks. (Animal Sciences)

Increasing plant diversity improves economic and environmental sustainability of humid pasture systems. Successful seedling establishment of forages is essential to maintaining grazing lands for livestock production however, harsh conditions often severely limit seedling survival. Scientists at University Park, Pennsylvania have examined how certain plants called facilitators help other plants survive the stressful establishment period. By designing pasture systems based on an improved understanding of positive plant interactions, it was found that the survival of cool season forages increased by planting them in complex mixtures rather than as monocultures. Using mixtures can provide increased environmental benefits of greater plant diversity, while increasing pasture productivity, profitability, and longevity. (Plant Sciences)

Effects of cropping systems on soil carbon is determined. There is an increasing interest in determining and quantifying the amount of carbon stored in soil organic matter as the result of various agricultural practices. Soil organic matter benefits the soil and environmental quality and can alleviate the build-up of atmospheric carbon dioxide by storing carbon in the soil. Scientists at numerous ARS research units across the U.S. have measured the effects of various cropping practices (tillage, rotations, cover crops, fertility management, etc.) on soil carbon and soil organic matter dynamics in a wide variety of soils, climatic zones, and cropping and grassland systems. ARS scientists at St. Paul, Minnesota improved a relatively inexpensive method they had developed for continuously measuring the exchange of carbon dioxide and other trace gases. Such continuous methods are needed to accurately determine the exchange of carbon dioxide between the land and atmosphere, and to develop soil carbon budgets. This research provides the information needed by policymakers, resource managers, and farmers and ranchers to make better program, conservation, and land management decisions. (Soil, Water, and Air Sciences)

Carbon in crop land and grazing land soils of the United States inventoried. Carbon stored in agricultural and rangeland soils benefits soil, water, and air quality, but the extent of this resource on a national scale had until now not been fully estimated. ARS scientists at Fort Collins, Colorado along with Federal and State cooperators, conducted a national assessment of the carbon resource in crop and grazing land soils in the United States and published a book ("The Potential of U.S. Grazing Lands to Sequester Carbon and Mitigate the Greenhouse Effect") on how a much greater amount of carbon might be stored in grazing lands. In 1997, U.S. crop and grazing land soils were estimated to be increasing in soil carbon content at the annual rate of approximately 15 million metric tons and 6 million metric tons, respectively. The total national potential for carbon storage is as much as 200 million metric tons in crop land soils and 110 million metric tons in grazing land soils. These estimates are being used by policymakers to plan resource conservation programs and identify strategies for reducing U.S. contributions to the increases in atmospheric gases that may contribute to global warming. (Soil, Water, and Air Sciences)

More efficient storage of valuable genetic stocks for improving forage quality. Improving the resistance of forage grasses to diseases, weeds, droughts, and other stresses requires access to diverse genetic stocks for breeding programs. Ultra-cold conditions (cryopreservation) are commonly used to store genetic stocks at low cost for long periods, but many warm season grasses perish under such condition. Scientists at Corvallis, Oregon have developed new techniques for successfully storing grass meristems in cold conditions. These techniques will lower the cost of maintaining a diverse mix of genetic stocks of warm season grasses by reducing reliance on vegetative preservation using clonal repositories, greenhouses, and field plots. (Plant Sciences)

Phytase added to the diet of chickens reduces manure phosphorous levels. An adverse environmental impact of poultry production is the high levels of phosphorous in the poultry manure. However, reducing phosphorous in the diet generally reduces production performance of broiler chickens. ARS scientists have determined that

the level of phosphorous can be reduced in broiler rations when phytase is included without causing any adverse effects on growth, feed efficiency or bone strength. At the same time, the total amount of phosphorous excreted in the manure is reduced. This discovery will enable the poultry industry to reduce the amount of phosphorous generated from poultry production operations, while maintaining a profitable production system. (Animal Sciences)

REE Goal 5–Empower people and communities, through research-based information and education, to address the economic and social challenges of our youth, families, and communities.

Current Activities

ARS conducts research to identify new crops, products, technologies, and practices which increases profitability, expands markets, adds value, and makes small scale processing capabilities available in rural communities. Access to technologies and information is expanded and simplified so that ranchers and rural residents can obtain information in a timely manner.

ARS' research accomplishments include: wasps trained to detect the presence of specific chemicals, and cultural/composting practices that improve soil and reduce plant disease.

Selected Examples of Recent Progress

Cultural and composting practices improve soil quality and decrease plant diseases. Intensive crop production practices can decrease soil quality and increase the incidence of plant diseases leading to a nonsustainable production system increasingly dependent upon expensive and potentially harmful inputs. ARS researchers at Beltsville, Maryland developed a production system for strawberries and other fruit and vegetable crops using on-farm compost and cultural practices, such as drip irrigation, mulch, and disease free stock for planting that can replace fumigation with methyl bromide, a chemical that will soon be banned for preharvest uses. These practices have been shown to be effective in controlling the devastating red stele disease in strawberries while at the same time improving soil tilth. This more sustainable system can be used by all sizes of operations and is especially useful for small (e.g., pick your own) growers producing high quality, high value crops. (Integration of Agricultural Systems)

ARS soil scientist receives Onassis Prize. ARS soil scientist John W. Doran received the Onassis Prize for the Environment from the Alexander S. Onassis Public Benefits Foundation in Athens, Greece, on November 7, 2000 for his research promoting soil health and sustainable agriculture. The Foundation promotes the sciences, humanities, cultural arts and philanthropic works through educational scholarships, research grants, and other programs. Dr. Doran was selected to receive the environmental award for scientific achievements including the development of a practical test kit and other indicators to help farmers and other agricultural professionals monitor soil health. The kit, which is now commercially available after more than 10 years of research and development, is also intended to help farmers gauge the sustainability of their land management practices. More than 5,000 copies of a training manual for assessing and interpreting soil quality have been distributed worldwide. Dr. Doran is with the ARS Soil and Water Conservation Research Laboratory in Lincoln, Nebraska. (Soil, Water, and Air Sciences)

Parasitic wasps trained to detect the presence of specific chemicals. Numerous chemicals are used in many areas of agriculture which along with their residues may be injurious to humans and the environment. ARS scientists at Tifton, Georgia previously showed that parasitic wasps can be trained to track novel chemical odors. ARS scientists at Gainesville, Florida, and scientists at Iowa State University and the University of Georgia (and with funding from the Department of Defense) produced a parasitic wasp-based technology. Trained wasps are used as keen, portable, and flexible biosensors for monitoring samples of air for the presence of chemicals having agricultural, medical, or security interest. A patent application has been submitted for the

technology which will enable growers and others to evaluate the characteristics of alternative agricultural systems that release various chemicals to the atmosphere. (Integration of Agricultural Systems)

REE Goal 6--Management Initiative-Ensure and enhance worldwide access to agricultural information through the programs of the National Agricultural Library.

Current Activities

Through the programs and services of the National Agricultural Library (NAL), ARS ensures that agricultural information essential to the Nation is acquired, organized, disseminated, and preserved for current and future use and that advances are made in improving access to such information through the application of modern information technologies. NAL's work is related to ARS goals and performance measures in extension, outreach, education, library services, and higher education.

NAL's accomplishments include expanding electronic availability of information through increased access to networked resources, development of web-based products and services, and enhanced partnerships with information producers.

Selected Examples of Recent Progress

AGRICOLA database is expanded and enriched. NAL produces the AGRICOLA (AGRIculture OnLine Access) database, the world's premier finding aid to the literature of agriculture. AGRICOLA now contains over 3.6 million bibliographic citations to agricultural information. Almost 100,000 indexing records, abstracts, and cataloging records were added in FY 2000. For publications that exist in electronic form and can be accessed freely via the Web, AGRICOLA provides a direct connection. More than 11,000 linkages from AGRICOLA citations to the electronic form of full text research information, databases and images have been created which dramatically reduces the time between identification and retrieval of these key information resources. (Agricultural Information and Library Services)

Delivery of information services continues to grow and improve. The Library's total volume of direct client services grew to almost 23 million transactions in FY 2000, an increase of almost 60 percent from the previous year largely as a result of increased use of its Web-based products and services. A new tiered services reference model was implemented to improve more effective reference service. (Agricultural Information and Library Services)

Agriculture Network Information Center (AgNIC) expanded. The Agriculture Network Information Center (AgNIC), http://www.agnic.org, made substantial progress both in building partnerships and implementing a state-of-the-art Web-based search system. Currently, there are 40 members in AgNIC covering more than 40 subjects. The AgNIC Coordinating Committee met in April 2000 at NAL with over 50 international participants from the United States, Mexico, England, Costa Rica, Australia, and Canada. In August, the technical development team, a collaboration between NAL and Cornell University, released the new search system which permits searching across the Web sites of all AgNIC partners with one search rather than the separate ones required previously. (Agricultural Information and Library Services)

More digital information resources accessible. With renovation of the first floor public areas, electronic information resources became more accessible to customers through the Library's Electronic Media Center. The collection of electronic reference tools, abstracting and indexing resources, and full text journals that can be searched onsite was expanded to over 350 titles and a new Web-based interface was deployed. (Agricultural Information and Library Services)

Web-based information products and services expanded. NAL continues emphasis on expanding its presence on the Web in order to provide broader access to information for its global clientele on a 24 hour per day seven

days per week basis. Recognition of NAL Web sites as quality sources of information on emerging and critical issues continues to grow. (Agricultural Information and Library Services) New resources includes:

--Invasive Species. NAL and the Geological Survey's National Biological Information Infrastructure are collaborating in building a comprehensive, online information system (http://www.invasivespecies.gov) that facilitates access to information about invasive species.

--Screwworm. NAL Special Collections has completed a Web-accessible CD-ROM sampler of the Screwworm Eradication Program Collection which NAL has acquired from researchers in the U.S. and Mexico. It documents seven decades of extraordinary agricultural and scientific achievement.

--Kids'SciencePage.This Web site, (http://www.nal.usda.gov/outreach/youthkids.htm,) includes information about agricultural science projects, careers in agriculture, and links to full text resources and libraries nationwide.

--Drought Page. The Library's Water Quality Information Center has developed an extensive new resource for agricultural aspects of drought, weather and climate (http://www.nal.usda.gov/wqic/drought.html). The Web site contains links to prediction and monitoring tools, drought and weather organizations, State-specific drought information, and related full text papers and articles.

--Food and Nutrition Information Center. This Web site (http://("www.nal.usda.gov/fnic/) received a "superior" rating for its Web site in the *Encyclopedia Britannica's* Health Section: Nutrition and Diet."

NAL preservation activities. A major activity was the completion of the digital preservation and online access of USDA's *Journal of Agricultural Research* , all 78 volumes of which were digitized according to best preservation practices developed at NAL. The searchable access version of the journal is available online (http://preserve.nal.usda.gov:8300/jag/) and is linked to the *Agricultural Research Magazine.* NAL also serves as the national agricultural literature archive, and has received 1,366 reels of master negative film from United States Agricultural Information Network (USAIN) microfilming projects to date. (Agricultural Information and Library Services)

Historic collections and archives. As part of its program to identify and acquire significant archives which document the advances of U.S. agriculture, NAL will receive two important collections:

--The Society of American Florists has donated their historic collections to NAL's Special Collections and provided funding for improving access and preservation. The materials include early records of the floral industry in the U.S. as well as some rare volumes.

--The late Dr. Edward F. Knipling signed a "Deed of Gift" in February donating his papers to NAL. The acquisition of his papers will significantly enhance NAL's historical collections. An oral history videotape of Dr. Knipling's work with the Screwworm Eradication Program was also completed.

AGRICULTURAL RESEARCH SERVICE

Proposed Language Changes

The estimates include appropriation language for this item as follows (new language underscored; deleted matter enclosed in brackets):

Buildings and Facilities:

For acquisition of land, construction, repair, improvement, extension, alteration, and purchase of fixed equipment or facilities as necessary to carry out the agricultural research programs of the Department of Agriculture, where not otherwise provided, [$74,200,000] $30,462,000, to remain available until expended (7 U.S.C. 2209b): Provided, That funds may be received from any State, other political subdivision, organization, or individual for the purpose of establishing any research facility of the Agricultural Research Service, as authorized by law.

AGRICULTURAL RESEARCH SERVICE

BUILDINGS AND FACILITIES

Appropriations Act, 2001		$74,200,000
Budget Estimate, 2002		30,462,000
Decrease in Appropriation		-43,738,000
Adjustments in 2001:		
Appropriations Act, 2001	$74,200,000	
Rescission under P.L. 106-554 a/	- 163,000	
Adjusted Base for 2001		$74,037,000
Budget Estimate, Current Law, 2002		30,462,000
Decrease over adjusted 2001		-43,575,000

a/ The amount is rescinded pursuant to Section 1 (a) (4) of P.L. 106-554.

SUMMARY OF INCREASES AND DECREASES
(On basis of adjusted appropriation)

Facilities	2001 Estimated	Changes	2002 Estimated
Arizona: U.S. Arid Land Agricultural Research Center, Maricopa	$4,989,000	-$4,989,000	--
California: Western Human Nutrition Research Center, Davis	--	+5,000,000	$5,000,000
Western Regional Research Center, Albany.	4,889,000	-1,089,000	3,800,000
District of Columbia: U.S. National Arboretum	3,323,000	+1,277,000	4,600,000
Hawaii: U.S. Pacific Basin Agricultural Research Center, Hilo/Oahu	4,989,000	-4,989,000	--
Illinois: National Center for Agricultural Utilization Research, Peoria	--	+6,500,000	6,500,000
Greenhouse Complex	3,592,000	-3,592,000	--
Iowa: National Animal Disease Center, Ames.	8,980,000	-8,980,000	--
Kansas: U.S. Grain Marketing Research Laboratory, Manhattan	3,492,000	-3,492,000	--
Maine: Northeast Marine Cold Water Aquaculture Research Center, Orono	2,495,000	-2,495,000	--
Maryland: Beltsville Agricultural Research Center, Beltsville	13,271,000	-13,271,000	--
Abraham Lincoln National Agricultural Library, Beltsville	1,766,000	+34,000	1,800,000
Mississippi: National Biological Control Laboratory, Stoneville	4,989,000	-4,989,000	--

Facilities	2001 Estimated	Changes	2002 Estimated
Montana: Fort Keogh Laboratory, Miles City	5,288,000	-5,288,000	--
New York: Plum Island Animal Disease Center, Greenport	6,985,000	-3,223,000	3,762,000
Pennsylvania: Eastern Regional Research Center, Philadelphia	--	+5,000,000	5,000,000
Utah: Poisonous Plant Laboratory, Logan	4,989,000	-4,989,000	--
Total Available	74,037,000	-43,575,000	30,462,000

Project Statement
(On basis of appropriation)

	2000 Actual	2001 Current Estimate	Increase or Decrease	2002 Estimate
	AMOUNT	AMOUNT		AMOUNT
Total Obligations	$29,517,000	$49,500,000	-800,000	$48,700,000
Unobligated Balances: Available Start of Year	-85,476,000	-108,459,000	+24,537,000	-132,996,000
Available End of Year	108,459,000	132,996,000	-18,238,000	114,758,000
Total Available or Estimate	52,500,000	74,037,000	-43,575,000	30,462,000

AGRICULTURAL RESEARCH SERVICE

PROPOSED INCREASES AND DECREASES--BUILDINGS AND FACILITIES

A total increase of $30,462,000 for **Buildings and Facilities**, consisting of:

a) An increase of $3,762,000 for the modernization of the **Plum Island Animal Disease Center**, Greenport, New York.

Explanation of Change. The Plum Island Animal Disease Center (PIADC) is located on a Federally owned 840 acre island located about two miles from the eastern tip of Long Island. Established by an Act of Congress in 1948, the former Fort Terry facility complex was transferred to USDA from the Department of Defense.

The Center is a unique national and hemispheric resource where ARS conducts state-of-the-art research and APHIS performs diagnostic work on foreign animal diseases that are an ongoing threat to U.S. livestock. Plum Island is the only site in the U.S. authorized by Congress where research can be carried out on foot and mouth disease and other highly contagious animal diseases. There are no alternative Federal or non-Federal mainland sites available with adequate biocontainment facilities to conduct this research.

In 1989, ARS and APHIS began to develop an overall long range plan for the repair and maintenance of the buildings and supporting infrastructures. Major renovation of the center is needed to ensure high quality research and biosafety. An architectural-engineering firm completed a detailed study of the condition and code deficiencies of the facility which totaled an estimated $202 million to correct. The phased modernization effort at PIADC is a consolidated project of both ARS and APHIS. In FY 2001, ARS received $6.985 million for ongoing modernization projects.

In FY 2002, ARS requests $3.762 million to provide for the continuation of the phased plan to modernize PIADC. Specific projects to be addressed in FY 2002 include the following: (1) $1.5 million for construction of coastal erosion control measures at Orient Point, Plum Island Harbor, and the lighthouse. These funds will implement construction for the project currently being designed by the U.S. Army Corps of Engineers. (2) $.5 million for clean-up of the construction debris site which contains materials removed during the facility modernization consolidation effort. These materials have been stored on Plum Island since that construction was completed. (3) $1.762 million for design and construction of improvements to the potable water distribution system and miscellaneous small projects/contingencies. This request is being supplemented by a similar request for modernization at PIADC in the APHIS budget.

b) An increase of $15,300,000 for modernization of facilities at the **ARS Regional Research Centers**: Albany, California ($3.8 million); Peoria, Illinois ($6.5 million); and Wyndmoor, Pennsylvania ($5 million).

Explanation of Change. Facilities constructed in the late 1930s are hampering ARS scientists in conducting advanced research since methodology, technology, and approaches have significantly changed over the last half century. Additional resources are needed to renovate and modernize all four major national research centers. The investment is essential for these centers to regain the scientific capacity necessary to make discoveries that will contribute to development of new domestic and foreign agricultural markets.

Due to the age of the regional research centers, all major building systems--heating, ventilation, air-conditioning, electrical, roofs, and infrastructures (paving, steam and water lines, and waste treatment disposal systems)--have either reached or passed their useful life expectancies. Other existing deficiencies affecting safety and health needs, such as fume hood upgrades, single pass air, and building code upgrade requirements need to be corrected.

Additional appropriations are required in FY 2002 to enable ARS to proceed with the phased modernization efforts at the Western Regional Research Center (WRRC), Albany, California; National Center for Agricultural Utilization Research (NCAUR), Peoria, Illinois; and Eastern Regional Research Center (ERRC), Wyndmoor, Pennsylvania. Since ARS has virtually no swing space to house displaced scientists, phased renovation of major centers is necessary while individual laboratories or wings of laboratories are being renovated. The major needs for these centers in FY 2002 are as follows:

WRRC Modernization. Industrial, food, and biological processing research and advanced manufacturing technology development is conducted at the Research and Development Facility (RDF) of WRRC. It plays a critical role in the center's research programs. Since the original construction of the center in the 1940s, very little renovation has occurred. As a result, room arrangements; interior finishes; and mechanical, plumbing, and electrical systems have deteriorated so they are no longer capable of supporting existing and future research programs.

In FY 1995, a construction contract was awarded using $800,000 of ARS funds to upgrade the "building envelope" of the RDF. In 1997, requirements for the modernization of the building's interior were developed using $180,000 of Agency funds.

The estimated design and construction costs for the entire project is $22.2 million. The construction costs of the five phases is estimated to be $19.6 million (i.e., Phase 1, $4.9 million; Phase 2, $3.8 million; Phase 3, $2.3 million; Phase 4, $5.4 million; and Phase 5, $3.2 million). In FY 2000, the Agency received $2.6 million for design of all phases of the modernization of the Research and Development Facility. In FY 2001, ARS received $4.889 million for construction of Phase 1. In FY 2002, ARS is requesting $3.8 million for construction of Phase 2.

NCAUR Modernization. The estimated design and construction cost for the modernization of the Central Wing (formerly the Chemical Wing) is $35.5 million. In FY 2000, the Agency received $1.8 million for design. In FY 2002, $6.5 million for Phase 1A construction is requested. Work will include an upgrade of HVAC and electrical systems, installation of a sprinkler system, and a stairway. Initially, bays on the west end of the Central Wing will be renovated and designed for expansion and tie-in with subsequent bays to minimize disruption of research during construction.

ERRC Modernization. In FY 1993, a facility condition study was completed to identify deficiencies in the Main Laboratory and Service buildings. It did not include project work required on the Administration Wing or other buildings. The findings indicated that the utilities and building infrastructures had generally reached the end of their useful life, and that in the past 50 years the facility itself has been overtaken by the evolution of building codes, ARS requirements, and research needs.

The modernization program involves nine phases: two in the Service building for the basic power plant requirements (Phase 1, completed in FY 1996, and Phase 8); two in the Engineering Research Laboratory (Phases 2 and 9); and five in the Chemical Wing (Phases 3 through 7). The total planning, design, and construction budget is estimated at $41 million over nine years. The Agency received $4 million in FY 1997 and $5 million in FY 1998 to fund construction of Phases 3 and 4. ARS received $3.3 million in FY 1999 to fund Phase 5. In FY 2000, the Agency received $4.4 million for construction of Phase 6 (Chemical Wing Laboratory). In FY 2002, ARS is requesting $5 million for construction of Phase 7 (Chemical Wing) and design of Phases 8 and 9 (Power Plant and Engineering Research Laboratory).

c) An increase of $1,800,000 for modernization of the **Abraham Lincoln National Agricultural Library**, Beltsville, Maryland.

Explanation of Change. The National Agricultural Library (NAL) built in 1968 is located in Beltsville, Maryland. It is one of four national libraries and the largest agricultural library in the world. The library houses a collection of more than 3.2 million items in 50 different languages accumulated from all parts of the

world. It serves as a national resource for information on agriculture and related sciences. Information contained in the printed collection is disseminated through bibliographies, loans, photocopies, and reference services to agricultural colleges and universities, research institutions, government agencies, agricultural associations, industry, scientists, farmers and ranchers, and the general public. Electronic information is widely disseminated via the World Wide Web.

The building has two principal components totaling over 315,000 g.s.f. A tower, consisting of fourteen floors and a penthouse, is connected to an expansive two-story wing. A basement containing mechanical equipment located below grade covers the entire building footprint.

The Library structure has undergone several modifications in its 30-year history. In recent years, new transformers and chillers were installed, the elevators renovated, fire protection system installed in parts of the building, mechanical equipment replaced, and a new roof membrane installed. However, in spite of systematic maintenance, systems that were new in 1968 have now exceeded their 20 to 25 year life expectancy and are becoming unreliable and require replacement.

In 1991, NAL completed a comprehensive facility condition study that identified numerous code, mechanical, electrical, and architectural deficiencies. The total cost to correct these deficiencies was estimated at nearly $18 million. However, escalating costs and inconsistent funding levels have increased the costs to correct the deficiencies to almost $32 million. In addition, NAL needs to convert existing personnel space to storage space for expanding Library collections. The first Phase of this modernization has been accomplished. Current plans to relocate existing functions from the fourth to the first floor area are well underway, thereby making needed stack space available for collection storage. This consolidation effort will be accomplished in two phases.

In FY 1998, $2.5 million was received for the First Floor renovation. In FY 1999, 1.2 million was received for the Phase 1 air handling unit replacement. In FY 2001, ARS received $1.766 million for Fourth Floor renovations, and mechanical, electrical, plumbing, and life safety renovations. ARS is requesting $1.8 million in FY 2002 to continue upgrade of major electrical distribution deficiencies.

d) An increase of $4,600,000 for modernization of the **U.S. National Arboretum**, Washington, DC.

Explanation of Change. The U.S. National Arboretum (USNA) was created by an Act of Congress in 1927 as a center for research and education in the plant sciences. Since 1959, the Arboretum has also been open to the public as a display and show area for ornamental plant materials as well as continuing to function as a center for research and education.

The Arboretum is located in northeast Washington, D.C. on a 446-acre tract less than three miles from the Capitol and the White House, with acceptable access to major transportation routes. In 1927, the location was a rural section of Washington. Since that time, the area surrounding the Arboretum has developed industrial centers, high-density housing, and heavily traveled roadways. Because of urbanization, the Arboretum has become a green oasis in an otherwise intensely developed metropolitan area. Its proximity to many tourist attractions and ease of access offers countless educational opportunities for residents of the city and the estimated 28 to 36 million who visit Washington, D.C. each year.

Because of aging, many of the major Arboretum building systems--heating, ventilating, air conditioning, electrical, roofs, and infrastructure (paving, fences, steam and water lines)--have either reached or passed their useful life expectancy. Other facility deficiencies involving safety and health needs must also be corrected. Cost estimates have been made to upgrade the facilities to present day standards.

In FY 2000, ARS received $500,000 for design of a new entrance from Bladensburg Road. In FY 2001, ARS received $528,834 for design of the Administrative Building modernization, and $2,793,840 for design and

construction of lateral irrigation lines replacement. In FY 2002, ARS requests $4.6 million for the following projects:

Administrative Building Modernization. The Administrative Building consists of about 36,178 g.s.f. for mixed use including offices, laboratories, an auditorium, and a herbarium. Based on a 1990 facility condition study, facility deficiencies exist involving electrical and HVAC systems, fire protection, handicap accessibility, and laboratory layout. Since the 1990 facility condition study, the electrical and HVAC systems have deteriorated to such an extent that their complete failure is imminent, threatening closure of key aspects of the Arboretum's research and education activities. Also, fire protection systems are lacking and accessibility accommodations are poor. In FY 2001, ARS received $528,834 for design. In FY 2002, an additional $370,000 is requested to fully fund the design cost of the Administrative Building.

Greenhouse Complex Renovation. In FY 1994, ARS completed a facility study of the Greenhouse complex which was built in 1959. In general, the facility was found to be structurally adequate but deficient in all other aspects including poor HVAC systems controls. There is also a need for an addition for the curator's, and maintenance and staff offices. The study recommended that renovations be accomplished in several Phases at a total cost of $5.2 million. Phase 1 has been completed. In FY 2002, an additional $3.630 million is needed to complete the design phase and continue construction on the first of several phases.

Bladensburg Road Entrance. Based on the findings of an ongoing Master Plan for the Arboretum, a new entrance off Bladensburg Road would provide a more direct access to visitor services and be more centrally located. The current entrance from New York Avenue is difficult to use because of existing traffic patterns. The existing R Street entrance cannot support heavy visitation traffic because it necessitates traveling through a neighborhood to reach the Arboretum which is not readily visible from a main thoroughfare. In addition to a new entrance, there is a need to widen existing roads and provide storm water management control. The District of Columbia government is strongly supportive of these proposed improvements to the Bladensburg Road entrance. In FY 2000, $500,000 was appropriated for planning and design. This funding has been used for site investigation and geotechnical studies, as well as to fund revisions to the Bladensburg Road reconstruction. In FY 2002, $600,000 is requested to fully fund the remaining design phase.

e) An increase of $5,000,000 for design and construction of the **Western Human Nutrition Research Center**, Davis California.

Explanation of Change. ARS made the decision to move the Western Human Nutrition Research Center (WHNRC) to the campus of the University of California at Davis in 1996. Linking it with UC Davis' Departments of Nutrition and Food Science and Technology, the commodity departments of the College of Agricultural and Environmental Sciences, and the Schools of Medicine and Veterinary Medicine will provide the basis for an innovative, world class program to design food for health. Enhancing the nutritional and disease protecting components of agricultural commodities can reduce health care costs, improve the quality of life, and increase the international competitiveness of agriculture. In view of the fact that California provides 60 percent of the Nation's fruits and vegetables, it is in the national interest to have a center in that area conducting multidisciplinary research involving nutrition, medicine and agriculture.

Congress has appropriated a total of $20.35 million in FY 1998, FY 1999, and FY 2000 for the design and construction of 49,000 g.s.f. of laboratory and office space for the USDA-ARS Western Human Nutrition Research Center. Since the original cost estimates were developed over three years ago, construction costs in northern California have escalated above the anticipated rate of inflation. In March 2000, the design architect submitted preliminary construction cost estimates indicating that there was a significant budget shortfall. In FY 2002, ARS is requesting an additional $5 million for design and construction costs to complete the design and build the 49,000 g.s.f. facility as originally planned. Without additional funding, the scope of the project will be reduced to approximately 43,000 g.s.f. to stay within current available funds.

Agricultural Research Service
Status of Construction Projects as of December, 2000

Status of research facilities authorized or funded in prior years and reported as uncompleted in the 2001 Explanatory Notes, is as follows:

NOTE: Design criteria, provided by ARS, specifies the program requirements for the facility and forms the basis for negotiation of architect-engineer contracts. Diagrammatic drawings or concept drawings provide the basis for the first review of the architect's design. Tentative drawings or architect's design are provided by the architect for firming up cost estimates and basis for developing the completed, and final working drawings.

Location and Purpose	Year	Amount of Funds Provided	Description
Arizona, Maricopa	1995 Planning	$ 396,000	Planning and design of the replacement facility is partially funded. Pre-design awarded in the Fourth Quarter of FY 2000 for completion by the Third Quarter of FY 2001.
U.S. Water Conservation	1999 Planning	500,000	
Research and Western Cotton	2000 Planning	1,400,000	
Research Laboratory	and Design		
	2001 Construction	4,989,000	
	Total	7,285,000	
California, Albany	1994 Planning and	$ 1,161,000	Modernization of the North Wing is complete. Design for the multi-phase modernization of the Research and Development Facility is scheduled for completion in the Third Quarter, FY 2001. Construction for Phase 1 was funded in FY 2001. $3.8 million is requested in FY 2002 for construction of phase 2 of the 3 phase project.
Western Regional	Construction		
Research Center	1995 Construction	919,000	
	1997 Construction	4,000,000	
	2000 Design	2,600,000	
	2001 Construction	4,889,220	
	Total	13,569,220	
California, Davis	1998 Planning and	$ 1,700,000	Pre-design and design contract was awarded in the Second Quarter of FY 2000 for completion by the Second Quarter of FY 2002. Construction contract is scheduled for award in the Third Quarter of FY 2001. $5 million is requested in FY 2002 to restore the facility to its original scope of 49,000 GSF.
Western Human Nutrition	Design		
Research Center	1998 Construction	3,500,000	
	1999 Construction	6,150,000	
	2000 Construction	9,000,000	
	Total	20,350,000	

Status of Construction Projects as of December, 2000 (cont'd)

Location and Purpose	Year	Amount of Funds Provided	Description
California, Parlier			
Horticultural Crop Research Laboratory and Water Management Research Laboratory	1993 Planning	$ 300,000	Construction of the new facility is scheduled for completion in the Fourth Quarter of FY 2001.
	1994 Planning	2,630,000	
	1995 Construction	2,630,000	
	1998 Construction	23,400,000	
	Total	28,960,000	
District of Columbia			
U.S. National Arboretum	2000 Planning and Design	$ 500,000	Design for the renovation of the Administrative Building was partially funded in FY 2001. A design contract will be awarded in the 3rd quarter of FY 2001. Extension of irrigation system lateral lines into the collections and research plots, including installation of an automated control system was also funded in FY 2001. $4.6 million is requested in FY 2002 for continuing modernization projects.
	2001 Design & Construction	3,322,674	
	Total	3,822,674	
Georgia, Athens			
Southeast Poultry Research Laboratory	1992 Planning	$ 400,000	Existing project has been placed on hold. A feasibility study has been directed by the Congress in FY 2001 to consolidate ARS research on avian viral diseases at this laboratory.
	1993 Construction	677,000	
	Total	1,077,000	
Hawaii, Hilo			
U.S. Pacific Basin Agricultural Research Center	1999 Planing and Design	$ 4,500,000	
	2000 Construction	4,500,000	Pre-design is scheduled for completion in the Second Quarter of FY 2001.
	2001 Construction	4,989,000	
	Total	13,989,000	

Status of Construction Projects as of December, 2000 (cont'd)

Location and Purpose	Year	Amount of Funds Provided		Description
Illinois, Peoria	1992 Planning	$ 1,825,000		Construction of the final segment (Segment 3) of the Pilot
National Center for	1993 Planning	1,545,000		Plant renovation is scheduled for completion in the Third
Agricultural	1996 Construction	3,900,000		Quarter of FY 2001. Design of the Central Wing (previously
Utilization Research	1997 Construction	1,500,000		identified as Chemical Wing) modernization is scheduled for
	1998 Construction	8,000,000		completion in the Third Quarter of FY 2001. $6.5 million
	1999 Construction	8,200,000		is requested in FY 2002 for construction of Phase 1A of the
	2000 Design	1,800,000		3-Phase project.
	Total	26,770,000		
Illinois, Urbana				
Plant Physiology and	2000 Planning and	$ 400,000		Design and construction of new greenhouse complex is fully
Genetic Research	Design			funded. Pre-design is scheduled for completion in the
Laboratory	2001 Construction	3,592,080		Second Quarter of FY 2001, with design scheduled for
	Total	3,992,080		award in the Third Quarter of FY 2001. Construction
				is scheduled for award in the Third Quarter of FY 2002.
Iowa, Ames	1999 Construction	$ 2,957,000		Modernization of the Waste Water Treatment Plant is in
National Animal	1999 Reprogramming	1,943,000	**	progress. Renovation of Building 3bc is scheduled as the next
Disease Center	2000 Construction	3,000,000		phase of modernization. Design for new Biosafety Level 2
(NADC)	2001 Design & Construction	8,980,200		and 3 Animal Isolation Facilities, and design and construction
				for improvements to the utility service distribution systems
				were funded in FY 2001.
	Total	16,880,200		

** Reprogrammed from the National Swine Research Center as directed by Congress in the FY 1999 Omnibus Bill.

Status of Construction Projects as of December, 2000 (cont'd)

Location and Purpose	Year	Amount of Funds Provided	Description
Kansas, Manhattan Grain Marketing and Production Research Center	1995 Planning	$ 950,000	Design for the renovation of the existing facility is complete. Construction of Phases 1 and 2 are scheduled for completion in the Second Quarter of FY 2001. The construction of Phase 3 was partially funded in FY 2001.
	1996 Construction	1,000,000	
	1997 Construction	500,000	
	1999 Construction	1,400,000	
	2000 Planning and Design	100,000	
	2001 Construction	3,492,300	
	Total	7,442,300	
Louisiana, New Orleans Southern Regional Research Center	1992 Construction	$ 1,950,000	The modernization of the Chemical Wing is complete. Construction of Phase 1 of the Industrial Wing is scheduled for completion in the Fourth Quarter of 2001. Construction of Phases 2A and 2B of the 9 phase modernization of the Industrial Wing was funded in FY 2000.
	1993 Planning and	1,651,000	
	1994 Construction	2,667,000	
	1995 Construction	2,934,000	
	1996 Construction	900,000	
	1998 Design	1,100,000	
	1999 Modernization	6,000,000	
	2000 Modernization	5,500,000	
	Total	22,702,000	
Maine, Orono N.E. Marine Cold Water Aquaculture	2001 Design	$ 2,494,500	Design for the new facility is fully funded. Pre-design and design contract for the new facility is scheduled for award in the Third Quarter of FY 2001.

Status of Construction Projects as of December, 2000 (cont'd)

Location and Purpose	Year	Amount of Funds Provided	Description
Maryland, Beltsville	1988 Design & Construction	$ 5,750,000	Ongoing Projects:
Beltsville Agricultural	1989 Design & Construction	6,100,000	1995 Funds:
Research Center	1990 Design & Construction	9,860,000	Construction:
(BARC)	1991 Design & Cnstruction	15,999,792	-Construction of Building 004 modernization which was delayed because of fire is scheduled for completion in the First Quarter of FY 2002.
	1992 Design & Construction	16,000,000	
	1993 Design & Construction	13,547,000	
	1994 Design & Construction	19,700,000 *	1998 Funds:
	1995 Design & Construction	3,960,000	Design:
	1996 Design & Construction	8,000,000	- Feed Center is scheduled for completion in the Third Quarter of FY 2001.
	1997 Design & Construction	4,500,000	
	1998 Design & Construction	3,200,000	
	1999 Design & Construction	2,500,000	1999 Funds:
	2000 Design & Construction	13,000,000	Design:
	2001 Design & Construction	13,270,740	- Design for the new Poultry Production Facility is scheduled for completion in the Fourth Quarter of FY 2001.
	Total	135,387,532	
			2001 Funds:
			Design:
			- Design of Building 307 modernization which was funded in FY 2001 is scheduled for award in the Fourth Quarter of FY 2001.
			Construction:
			- Construction of Phases 1 & 2 of the Beltsville Human Nutrition Research Center which were funded successively in FY 2000 and FY 2001 is scheduled for award in the Third Quarter of FY 2001.

*Appropriated under USDA Rental Payments Account.

Status of Construction Projects as of December, 2000 (cont'd)

Location and Purpose	Year	Amount of Funds Provided	Description
Maryland, Beltsville (cont'd)			
National Agricultural Library	1998 Design & Construction	$ 2,500,000	Phase 1 of the multi-phase modernization of NAL was completed in the First Quarter of FY 2000. Replacement of the air handling units is complete. Construction of the 5th floor renovation funded in FY 2001 is scheduled for award in the Fourth Quarter of FY 2001. $1.8 million is requested in FY 2002 to continue upgrade of major electrical systems.
	1999 Design & Construction	1,200,000	
	2001 Design & Construction	1,766,106	
	Total	5,466,106	
Michigan, East Lansing	1992 Planning	$ 250,000	Design for the multi-phase modernization of the facility is scheduled for completion in the Fourth Quarter of FY 2001.
Avian Disease and Oncology Laboratory	1993 Planning	212,000	
	1998 Planning and Design	1,800,000	
	Total	2,262,000	
Mississippi, Stoneville	1998 Planning and Design	$ 900,000	Design for the replacement facility is complete. Initial funds for site work provided in FY 2000. The construction of lab/office was partially funded in FY 2001.
Biocontrol and Insect Rearing Facility	1999 Planning and Design	200,000	
	2000 Construction	2,000,000	
	2001 Construction	4,989,000	
	Total	8,089,000	
Montana, Miles City	2000 Planning and Design	$ 530,000	Design and construction for modernization of the existing facility are fully funded. Pre-design is in progress.
Ft. Keogh Livestock and Range Research Laboratory	2001 Construction	5,288,340	
	Total	5,818,340	

Status of Construction Projects as of December, 2000 (cont'd)

Location and Purpose	Year	Amount of Funds Provided	Description
Montana, Sidney	1998 Planning and Design	$ 606,000	Design of the new facility is complete. Construction of
Northern Plains Agricultural			Phase 1 (Lab/Office Building) of the 2 Phased project is
Research Laboratory	1999 Construction	7,300,000	scheduled for completion in the Second Quarter, FY 2002.
	Total	7,906,000	
New Mexico, Las Cruces	1998 Planning and Design	$ 700,000	Design and construction of replacement facility are fully
Jornada Experimental Range			funded. Design for the replacement facility is complete.
Management Research	1999 Construction	6,700,000	Construction is scheduled for completion in the Second
Laboratory	Total	7,400,000	Quarter of FY 2002.
New York, Greenport	1993 Design and Construction	$ 2,540,000	Repairs to the Sewage Decontamination Plant and
Plum Island Animal			the Waste Water Treatment Plant are in progress.
Disease Center	1994 Construction	1,475,000	Replacement of various electrical distribution
	1995 Construction	1,168,000	systems were completed. Design of the firehouse/motorpool
	1996 Design and Construction	5,000,000	is scheduled for award in the Third Quarter of FY 2001.
			$3.762 million is requested in FY 2002 for continuing
	1997 Construction	5,000,000	modernization of the center.
	1998 Construction	2,000,000	
	1999 Construction	3,500,000	
	2000 Construction	3,500,000	
	2001 Construction	6,984,600	
	Total	31,167,600	

Status of Construction Projects as of December, 2000 (cont'd)

Location and Purpose	Year	Amount of Funds Provided	Description
Pennsylvania, Wyndmoor Eastern Regional Research Center	1997 Construction 1998 Construction 1999 Construction 2000 Construction Total	$ 4,000,000 5,000,000 3,300,000 4,400,000 16,700,000	Modernization of the Center is being accomplished in nine phases, with Phase 1 (Power Plant), Phase 2 Engineering Research Laboratory (Pilot Plant), and Phases 3 and 4 (partial construction of Chemical Wing Laboratory) completed. Phases 5 and 6 (continuing construction of Chemical Wing) is scheduled for completion in the First Quarter FY 2002 while Phase 6 is scheduled for completion in the Second Quarter FY 2003. $5 million is requested in FY 2002 for construction of Phase7 and design of Phases 8 & 9.
South Carolina, Charleston U.S. Vegetable Laboratory	1988 Feasibility Study 1990 Planning and Construction 1994 Construction 1995 Construction 1996 Construction 1997 Construction 1998 Construction 2000 Construction*** Total	$ 50,000 1,135,000 909,000 5,544,000 3,000,000 3,000,000 4,824,000 1,000,000 19,462,000	Construction of Phase 1 of the replacement facility is scheduled for completion in the First Quarter of FY 2002.

***Reprogrammed from Horticultural Crop and Water Management Research Laboratory, Parlier, CA

Status of Construction Projects as of December, 2000 (cont'd)

Location and Purpose	Year	Amount of Funds Provided	Description
Texas, Weslaco Subtropical Agricultural Research Laboratory	1994 Planning	$ 1,400,000	Construction of the Laboratory/Office Building and Greenhouses are complete. Other phases of modernization are being undertaken as funds become available.
	1995 Construction	3,009,000	
	1996 Construction	1,000,000	
	1996 Reprogramming	383,000	
	1997 Construction	4,000,000	
	Total	9,792,000	
Utah, Logan Poisonous Plant Laboratory	1998 Planning and Design	$ 600,000	Design for new facility is scheduled for completion in the Fourth Quarter of FY 2001. Funding appropriated in FY 2001 provides for partial costs required for full construction of facility.
	1999 Planning and Design	30,000	
	2000 Planning and Design	270,000	
	2001 Construction	4,989,000	
	Total	5,889,000	
West Virginia, Leetown National Center for Cool and Cold Water Aquaculture	1995 Planning	$ 1,921,000	Construction of new facility scheduled for completion in the Third Quarter of FY 2001.
	1997 Construction	6,000,000	
	1998 Construction	6,000,000	
	1999 Construction	2,000,000	
	Total	15,921,000	

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